INDEX TO ADVERTISERS

The first figures refer to advertisements in **Chemical Age Directory & Who's Who,** *the second to the current issue*

(Continued on page 936)

INDEX TO ADVERTISERS

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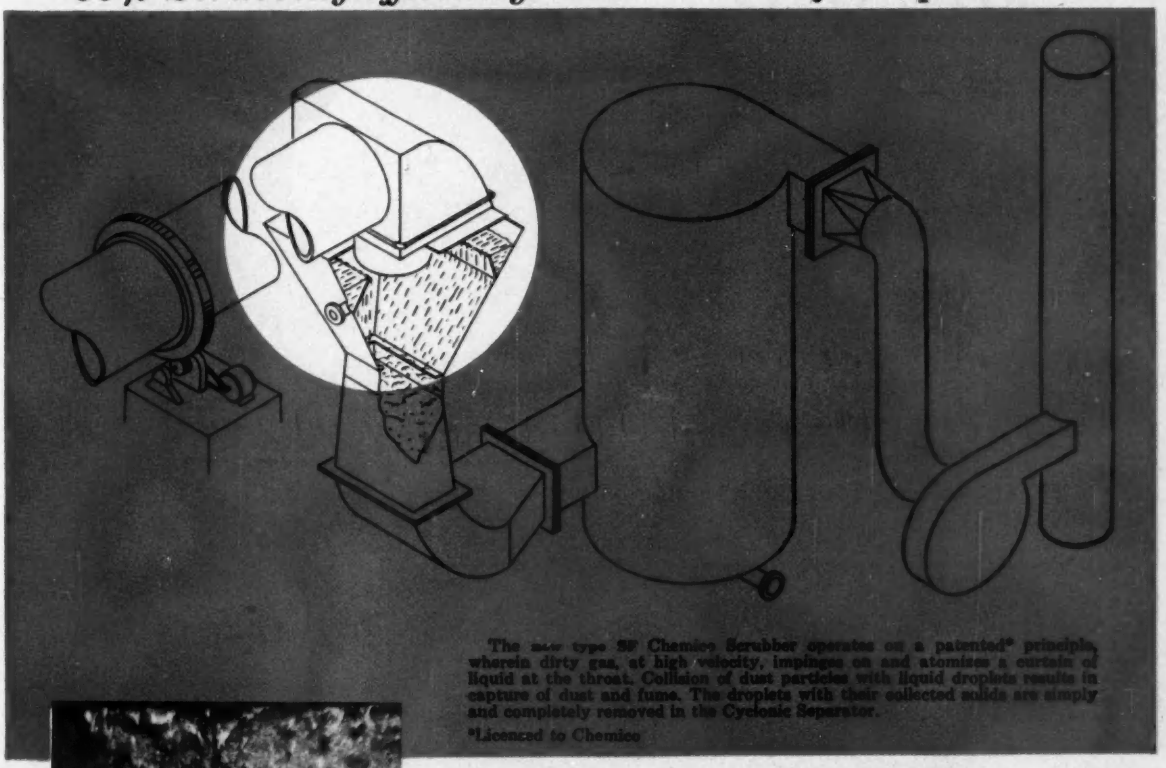
99% Scrubbing efficiency! Maintenance-free operation!



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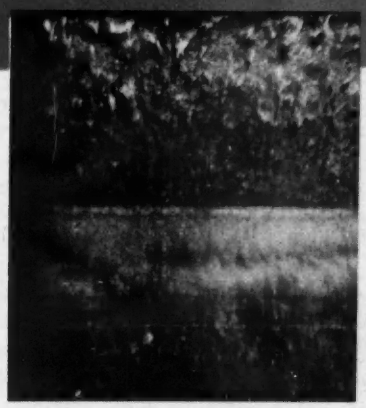

Actual photograph of throat action

A recent installation of the new type S.F. CHEMICO Venturi Scrubber is handling 40,000 cfm of hot gases from a 10′ x 250′ rotary Kiln and achieving over 99% removal of Lime dust from the kiln exhaust. No maintenance difficulties have been experienced and the unit is virtually foolproof, despite the use of a recycled slurry containing over 45% solids and many large lumps. The CHEMICO type S.F. Venturi Scrubbers are low cost, compact and readily installed in your plant.

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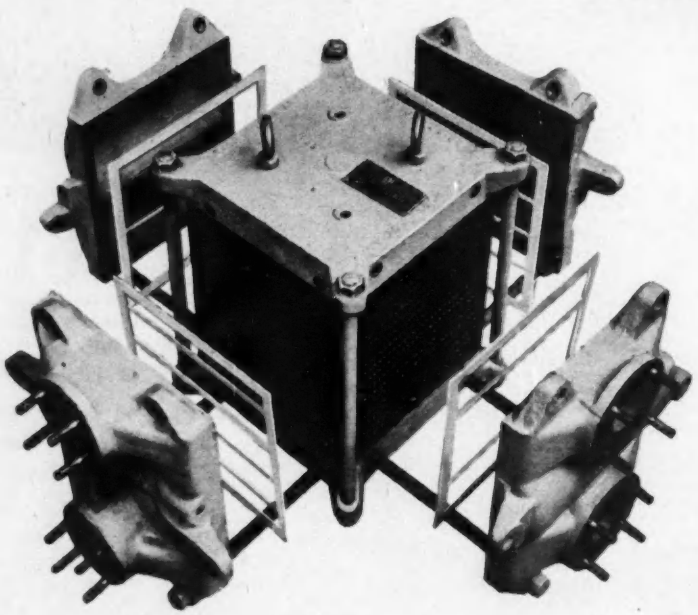

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RESEARCH IN AGRICULTURE

THE solution of a particular agricultural problem may not always be the straightforward process it might first appear, but often requires the services of experts in fields which are seemingly unrelated to agriculture. Each farm is completely individual with its own peculiar characteristics of soil and climate, and consequently its problems are individual too, but when the questions of farmers are considered as a whole a general pattern emerges. From this pattern it is possible to pick out the major difficulties and, although almost every practical problem is a complex of scientific problems, decide in which field the answer may be found. A survey of such problems is made by Sir William Slater, K.B.E., F.R.S., secretary of Agricultural Research Council, in *The Advancement of Science.*

To the farmer who is usually familiar with the layout of a modern field experiment, the answer to his problem may appear to lie in the comparison of say, two particular procedures in a practical trial, but such experiments must be repeated many times under as great a variety of conditions as possible before the outcome can be applied as a general principle, a process which may take years. The scientist may decide that the better course is to isolate the factors involved in different procedures and study them in detail in the laboratory by means of carefully controlled experiments. If he is successful the farmer can then be advised as to the best procedure in his particular case.

There have been many advances in crop husbandry since the war, but with the solution of one set of problems another has arisen. With increasing chemical control of weeds and the protection of growing plants from pests and diseases the farmer has been able to combat many of the problems which have beset him in the past, but there are still pests and diseases for him to worry about. It is inevitable that the problems which have resisted solutions are the ones which present the greatest difficulties to the scientist and in seeking methods of control he is being driven back more and more to the study of such fundamentals as the nature in inherited resistance to disease, host parasite relationship and the structure of the virus particle. The resolution of such problems calls for the work of the geneticist, the biochemist and the biophysicist.

Secondary problems have also arisen from the increased use of chemical sprays for the control of insects and fungal pests. A careful study of the movement of insect populations and the relationship between these and weather conditions is necessary in order to advise the fruitgrower as to the best time for the application of chemical control, but it is hoped that such studies will supply the farmer with accurate information of the economics of spraying and the time at which it will be most effective.

When spraying is necessary the farmer wants to know how he can best apply the chemical economically—the highest effective concentration, the dispersion into droplets of the right physical characteristics, etc.—problems which call for the help of the physicist, the engineer and the physical chemist, and often involve investigations of the most fundamental kind.

Of the two ways of developing the more effective insecticides and

fungicides the farmer needs, the examination of the effect of all available chemical compounds on different insects and fungi is obviously the task of the large manufacturer of organic chemicals, but the study of the biochemistry and physiology of insects and fungi to find the point in the metabolic process at which the chemical can most conveniently be applied, is more suited to a university or research institute.

The questions that farmers ask relating to the use of fertilisers present a formidable problem to the scientist. The quantity, type and most effective time of application are questions which can only be properly answered by applying a knowledge of the relationship between plant and soil, the fate of plant nutrients added to different types of soil, their inter-reactions and the role of organic matter in maintaining soil structure.

It is becoming increasingly obvious that production of crops of the highest standard and the subsequent best use of the land calls for the cooperation of scientists who have little knowledge of agriculture but without whose services the problems arising cannot be solved.

PLANT CONTRACTORS' PROBLEMS

THE closer collaboration of British chemical manufacturers with chemical plant contractors, urged by speakers at the annual dinner last year of the British Chemical Plant Manufacturers' Association (CHEMICAL AGE, 7 November, p. 641), seems to be coming about. On that occasion, Mr. H. W. Fender, then B.C.P.M.A. chairman, pointed out that member firms had been prevented from quoting for important overseas projects because they could not offer process 'know-how' as well as plant.

At the same dinner, Sir Walter Worboys suggested that the chemical firms who licensed processes abroad had a responsibility to try to ensure that in such cases British plant manufacturers built the installations or played a large part in their design. This view has been welcomed by the B.C.P.M.A. committee in its annual report for 1959 (see p. 949).

Although progress has not been as rapid as the committee would have wished, a number of cases of co-operation between the two industries has been noted. This is a good sign and it is to be hoped that the time will not be far off when a chemical company that is licensing a process or 'know-how' for sale overseas will automatically seek the co-operation of a British contracting company.

The success of some recent ventures should help to convince chemical manufacturers that they can amply justify the confidence placed in the plant firms concerned. An admirable example of how the two industries can collaborate on overseas projects was referred to recently by Mr. R. B. Potter, chairman of Simon-Carves. As reported in CHEMICAL AGE, 4 June, p. 909, his company have been working in close conjunction with I.C.I. on the overseas licensing and construction of polythene plants.

B.C.P.M.A. already co-operates to great advantage with the Association of British Chemical Manufacturers on many other aspects including delivery dates (where improvements are claimed), research programmes and standardisation. The annual report makes no reference to the thorny question of closer links with chemical producers so far as the construction of U.K. plants is concerned, but with the announcement earlier this year of a spate of major plant projects, the subject must be uppermost in the minds of many in the plant industry. So far as plant contractors are concerned it is a pity that so many of these major projects are to be constructed either by chemical companies themselves or by overseas firms, although in the latter case a number of these companies have U.K. subsidiaries, employ British scientists, technicians and labour as well as buying large quantities of British made plant and equipment.

A number of other projects—both new and extensions to existing plants—are known to be at an advanced stage and perhaps when announced they will bring important new business to the U.K. contractors. Names of contractors for the extension to Esso's ethylene facilities at Fawley and for Shell Chemical's polyisoprene plant at Carrington have also yet to be officially announced and it is likely that in the latter case a British firm will be named.

ISOOCTENYL ALCOHOL MARKET

NOW undergoing market development by Sinclair Petrochemicals, U.S., is isooctenyl alcohol and its chlorides. This alcohol seems to lend itself to a variety of possible industrial uses, and there are possibilities of new plasticisers and new herbicides. At Sinclair Research Laboratories, Harvey, Illinois, David W. Young and his co-workers have extensively investigated isooctenyl esters of dibasic acids such as phthalic and adipic acids.

Isoctenyl alcohol is a mixture of two isomeric primary allylic alcohols: 2,4,4-trimethyl-2-pentene-1-ol and 2-methylene-4,4-dimethyl-pentane-1-ol. The alcohol, it is thought, may be usable as a solvent for purifying chemical intermediates, or for making paints, lacquers, plastics and inks, and, due to its allylic structure, it is believed that it could be used as a controlling agent (chain arrester) in vinyl polymerisations. The most favoured possibilities, according to the Sinclair group, however, are the many derivatives that can be made with reactions involving both the double bond and the hydroxyl group of isooctenyl alcohol. Young reports that phthalic and adipic esters of the new alcohol have good potentialities as plasticisers. Uses would be the same as those for isooctyl derivatives, as pace-sellers among plasticisers for many resins (mainly vinyl and lubricants for jet engines).

As far as plasticiser properties and thermal, colour and ultra-violet light stability are concerned, diisooctenyl phthalate compares with phthalates made from eight-carbon oxo alcohols. This phthalate cannot be made directly by reacting the alcohol with phthalic anhydride at reflux temperatures as the reaction gives rise to too much of the monophthalate. A transesterification is used to produce the ester, and dimethyl phthalate is reacted with isooctenyl alcohol. A 90% yield of ester is obtained and most of the unreacted alcohol is recovered.

Meeting the low volatility requirements of herbicides are the isooctenyl alcohol esters of 2,4-D (2,4-dichlorophenoxy acetic acid). The isooctenyl compounds made with 2,4-D are said to be relatively insoluble in water, an important factor when using herbicides to control water weeds.

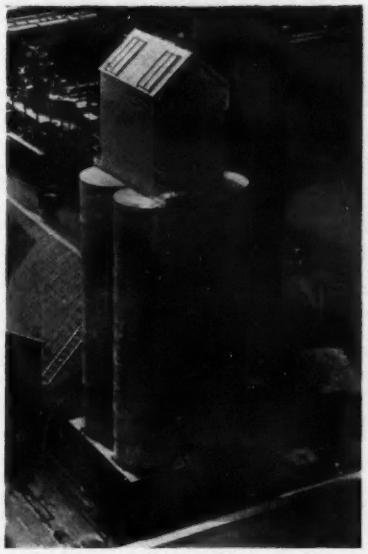
To make the herbicidal ester, 2,4-D is reacted with isooctenyl alcohol in toluene, using zinc stearate as a catalyst. Also made in the same way are the esters isooctenyl-3-indole butyrate and phenyl mercaptoacetate; these have not so far been found to have any industrial application.

MATERIALS FOR PACKAGING

IN our reference to polypropylene film last week we gave a figure of 1,194,000 tons as representing U.K. polythene production. This figure, of course, is the free-world total, of which about 11% is expected this year to go for the manufacture of polythene film. British output of polythene is this year expected to total some 120,000 tons, of which approximately 10-12% will go for polythene film production at home and abroad.

Statistics on polythene are to be published by the Board of Trade within the next few weeks; these will deal with polythene granules, film, rod, tube and sheet.

Plywood Silos for I.C.I. Alkali Plant



These four steel-bound plywood silos recently erected at I.C.I's Alkali Division sodium sesquicarbonate plant at Winnington, Ches, were designed and made by Portasilo Ltd., in accordance with details supplied by the division's engineering department.

Superphosphate Producers Meet in Venice

MORE than 500 delegates representing most of the countries of the world participated in the 28th annual congress of the International Superphosphate Manufacturers' Association, which was held in Venice on 29 May to 2 June.

Congress members visited the Montecatini's large-scale plants at Porto Marghera turning out an extensive range of phosphatic, nitrogenous, and compound fertilisers.

I.C.I. Win Safety Contest at Laporte Works

Eleven works safety teams from Lancashire and Cheshire concerns, took part in a competition organised by the Manchester Industrial Group of the National Society for the Prevention of Accidents at the Baronet Works of Laporte Chemicals Ltd., Warrington, on 2 June.

Winning team, which was awarded the Ferranti Trophy, was from the research department of the I.C.I. Northwich works.

I.C.I. Pigments Plant for Altona, Australia

The first plant in Australia to produce a range of industrial pigments will be set up by Imperial Chemical Industries of Australia and New Zealand on a 330-acre site at Altona, Melbourne. The project, which will cost £A1.5 million, is the first stage in the establishment of an Australian dyestuffs industry.

Project News

D.C.L. TO BUILD £2 MILLION ACETIC ACID PLANT AT HULL

A NEW acetic acid plant is to be built by the Chemical Division of the Distillers Co. Ltd. at its chemical factory at Hull at a cost of some £2 million. This plant will be the first of its kind in Europe. It will use a new process developed by the Distillers Company's research and development department at Epsom and based on the direct oxidation of a light petroleum fraction. It is expected that the new plant will be in operation early in 1962 when a proportion of the company's output of acetic acid will be made by this new process. Design is being handled by the company's own engineering department; announcement on the appointment of contractors is expected shortly.

The company has had a long experience in the manufacture of acetic acid which is produced by a two stage process from ethyl alcohol. The alcohol is first dehydrogenated to acetaldehyde which in turn is oxidised to acetic acid.

Until 1951 the ethyl alcohol was obtained by the fermentation of molasses. In that year ethanol synthesised from ethylene became available from the petrochemicals plant at Grangemouth jointly owned by D.C.L. and B.P. D.C.L.'s the manufacture of ethanol represents a considerable technical advance in this branch of applied organic chemistry.

Acetic acid is the most widely used of organic acids with applications in almost every branch of industry.

P.G. Engineering to Handle I.S.R. Extensions

● P.G. ENGINEERING LTD., one of the Power-Gas Group, have been awarded the contract covering both the definitive engineering work and site construction for general extensions to the main plant of the International Synthetic Rubber Co. Ltd. at Hythe, Southampton, during 1960. This extension will result in an overall increase of the plant capacity. Site work has already been started.

● THE lime and dolomite plant at the Durgapur Steelworks, West Bengal, India, has just been completed and is now in operation. It will supply raw materials used for steelmaking in the open hearth furnaces, which will use both limestone and burnt lime, the latter speeding up the process. Burnt dolomite is used for fettling the furnace lining after each tap.

The plant includes two vertical shaft lime kilns, each capable of producing 75 tons/day of burnt lime and, for dolomite burning, a horizontal kiln 275 ft. long with a diameter of 8 ft. 6 in. The plant has been constructed by Wellman Smith Owen Engineering Corporation Ltd.

I.C.I. Nobel Build Second Unit to Concentrate Nitric Acid by Magnesium Nitrate

THE second unit at I.C.I. Nobel Division's Ardeer factory to concentrate dilute nitric acid by the magnesium nitrate method is now being built alongside the existing unit, the first of its kind in Europe. Structural steel work has reached its 110-ft. height. Equipment will be installed as soon as the stage is completed.

In design, the second unit resembles the first, which is said to have amply fulfilled expectations. The process stems from U.S. work on methods of concentrating nitric acid by using, instead of sulphuric acid, a strong solution of magnesium nitrate in water which gave promising results. Nobel Division undertook the development work that resulted in the design and construction of the first plant.

Concentrated magnesium nitrate solution of 72% strength in water "avidly grabs" water from dilute nitric acid of 60% strength that comes from the Ardeer nitric acid plants. The resulting nitric acid has a 99.5% concentration. A series of interconnected column stripping columns, condensers, coolers and an absorption column and a system for re-concentrating the magnesium nitrate solution, which has been weakened by taking water from the nitric acid, must be kept in careful balance and control.

Special materials have been used for the plant equipment to cope with the corrosive action of hot nitric acid. High silicon iron, for instance, has been used for several items of equipment. Gaskets, joints, valve seats and small-bore pipelines are made from Fluon. I.C.I. titanium is to be used in some sections of the second unit.

The plant area is compact; a base area of some 40 sq. ft. supports a height of 110 ft. for each plant.

The new concentration system will be of special benefit when the division's new intermediate ammonia oxidation plant for dilute nitric acid production is on stream. That plant, with the magnesium nitrate concentration units, will form "a highly efficient system for converting ammonia into concentrated nitric acid".

Ardeer uses nitric acid to make nitroglycerine, nitrocellulose, ammonium nitrate, potassium nitrate (and magnesium nitrate for the concentration units), isopropyl nitrate and other nitrobodies.

I LEARN with interest from Badische-Anilin - and - Soda-Fabrik, something about their Haber-Bosch ammonia process, which is in use at the fertiliser plant under construction near the Aswan dam in Egypt. On completion of the fourth stage next year, it will have a 500,000 tons/year capacity of calcium ammonium nitrate. The product contains 20% pure nitrogen and each ton of nitrogen produces an additional yield of 15 tons of grain.

One ton of grain produces a daily ration of 250-300 grammes of bread for a year for 10 people. The Haber-Bosch process provides 10 million tons of nitrogen a year throughout the world, equivalent to the normal daily bread ration for 1,500 million people—more than a half of the world's population.

This large fertiliser factory is being built by a Franco-German consortium, comprising B.A.S.F., Friedrich Uhde GmbH, Dortmund, and the Compagnie Industrielle des Travaux, Paris. B.A.S.F. took 55% of the contract. First stage was completed in March, the second and third are due for completion in the summer and autumn of this year and the final stage will be on stream early in 1961.

I RECENTLY received further news of the activities of the Chemistry Section of the A.E.A. Technological Irradiation Group, which is still in the process of moving from Harwell to Wantage (CHEMICAL AGE, p. 842). Of interest to the textile industry are the investigations being carried out into the grafting of various monomers on to synthetic fibres with the object of improving dyeability and reducing the tendency to accumulate static charge. Grafting techniques are also being used to reduce the dose required for the vulcanisation by irradiation of natural rubber. It has been found possible to do this to the extent of a factor of 10.

In the field of oxidation, the radiation initiated in both gaseous and liquid phases, particularly in methane and tetralin, is being studied to obtain high yields of intermediate compounds. It is known that if the temperature of oxidation can reduce such yields are obtained.

A fundamental study is being made of the effects of radiation on catalysts, particularly zinc and nickel oxide, in which it is found that radiation has a marked effect.

PRESSURE on space last week prevented me from giving some interesting figures on the research and development cost of the new Proban flame-resistant process. In the Commons adjournment debate, Mr. George Craddock, M.P. for Bradford South, drew attention to the Molony Report which had referred to suggestions that the use of flame-resistant fabrics should be a statutory requirement, at any rate in children's nightwear.

He then spoke of the joint Albright and Wilson-Bradford Dyers' Association company, Proban Ltd., object of which is to co-operate in a research programme aimed at developing a durable flame-resistant process. The company started with a nominal capital of £1,000. From 1954 to 1959 it suffered an accumulated loss of £136,000. In addition, the parent companies have spent a further £170,000 on research and full scale trials of textile machines. That makes a total loss of £306,000 and it is expected that the firms will spend a further £100,000 in the next two years (and not £1,000 as reported in *Hansard*).

Now that Proban have reached the stage when cotton and winceyette can be processed so as to be non-flammable and safe for children to wear, they should be given full marks for the exercise and expense involved. In view of what Mr. John Rodgers, Parliamentary Secretary, Board of Trade, said about the "bitterly disappointing" response to the treated fabrics, it looks as though Proban and the parent companies will have to wait a long time for any substantial return.

NAPHTACHIMIE'S claim that their new polyisobutylene plant now being built at Lavera in southern France (CHEMICAL AGE, 21 May, p. 853) will make them Europe's only producer of this product, is, of course, not true, as it has been imported into this country from Germany for many years.

Badische Anilin-and-Soda-Fabrik AG, Ludwigshafen, have been producing polyisobutylene for about 25 years—as many readers have 'phoned to point out. In fact their U.K. distributors, F. A. Hughes and Co. Ltd., 4 Stanhope Gate, London W.1, were formed at about the time that B.A.S.F. first started making the product.

Naphtachimie are jointly owned by Pechiney and Soc. Française de Petroles B.P., a British Petroleum subsidiary. They will make polyisobutylene under U.S. Cosden Petroleum's licence, which gives Naphtachimie exclusive production rights in the Common Market area.

NEWS that Consolidated Zinc Pty. and Monsanto Chemicals Australia are forming a joint company to make the Isceon range of fluorocarbons in Australia (CHEMICAL AGE, 4 June, p. 929), followed the announcement of a similar joint French-Australian venture. Pacific Chemical Industries Pty. have been set up in New South Wales by Australian Cream Tartar Co. and Ugine of France.

Ugine have licensed this firm to use their process for making fluorocarbons—Pacific Chemical also have a Stuaffer Chemical licence to produce the raw materials for these and similar products. The plants will cost £A800,000 and are expected to be in production next year.

The Consolidated Zinc-Monsanto company is also locating its plant in N.S.W. —at Monsanto's Sydney site. This plant is also expected to be in production next year. The Isceon range is made in the U.K. by Imperial Smelting, a member of the Consolidated Zinc Group. The two projects will give Australia its first fluorocarbons production.

A JAPANESE development which is an example of advanced and, I am told, original designing is described by Mr. Robert H. S. Robertson, the well-known raw materials consultant in p. 953. Of particular interest in the china clay, ball clay and related industries, it is the Hosokawa fine-grinding mill.

Tests were carried out in this country by Northgate Traders (City) Ltd., 36-38 Copthall Avenue, London E.C.2, and Mr. Robertson has had access to results throughout the trials. He says that impurities can be removed from kaolinite clays in a way that "opens new possibilities".

The Hosokawa family is well known in scientific circles in Japan for it founded as an independent research organisation the Hosokawa Micromeritic Laboratory, who publish a magazine known as *Micromeritics*.

FURTHER details reach me of the mile long effluent line laid for Monsanto Chemicals under the Usk estuary (see CHEMICAL AGE, 4 June, p. 909). Before the discharge position 5,000 ft. out in the Bristol Channel, at a point below the lowest predicted tide level, was chosen, Monsanto had carried out work on a model of the estuary at the Hydraulics Research Establishment at Wallingford, Berks.

The steel pipes are protected externally with a bituminous solution reinforced with a woven glass sheathing covered with a 1½ in. layer of reinforced concrete. After welding the lengths into two sections of 2,440 ft., the inside was lined with 15 mil dry-film thickness of a coal tar-base epoxy resin. As it was not possible to coat the tie-in joint internally after welding, stabilised stainless steel sleeves, 18 in. long, were welded to the sections before making the final joint.

A 3 ft. deep trench, about 8 ft. wide at the top was made in the Channel bed by pulling a 100-ton draw bar pull plough through the Channel bed. The discharge end of the pipe is anchored and the whole length is cathodically protected.

Alembic

Chemical Producers Urged to Make Know-how Available to Contractors

B.C.P.M.A. Report and Overseas Licensing

IN response to a request from the British Chemical Plant Manufacturers' Association, the Association of British Chemical Manufacturers in 1959 asked certain of its members to consider seriously making 'know-how' available to plant manufacturers anxious to quote for Soviet projects. This is stated in the annual report of B.C.P.M.A. It is also hoped that U.K. chemical companies will license processes to B.C.P.M.A. members so they can compete in this respect with U.S. and German contracting organisations.

The report refers to the speech at the annual dinner last year, in which the chairman referred to the fact that B.C.P.M.A. members had been precluded from quoting for important projects in the U.S.S.R. and other countries because they could not offer process 'know-how' as well as plant. The committee was glad to hear Sir Walter Worboys, also at the dinner, suggest that U.K. chemical producers who licensed processes abroad had a responsibility to try to ensure that in such cases British plant manufacturers built the installations or played a large part in their design.

The report states "It is most important that British chemical plant contractors should be able to secure the co-operation of British chemical manufacturers so that they can offer plant complete with process."

During the year, although progress had been less rapid than the committee wished, a number of cases of collaboration between members of the two associations was reported. It was hoped that such co-operation would continue and be extended so that the U.K. chemical plant industry was well placed to compete for the increased business "which must come from the many overseas countries which have expanding and developing chemical industries".

State of Order Books

The state of B.C.P.M.A. members' order books reflected the general slowing down of the rate of industrial development over the past 18 months. Capital spending by the U.K. chemical and allied industries, so far as could be judged from the incomplete figures available at the time of preparing the report, was substantially below the 1958 and 1957 levels. By the year end a marked change in the business climate was discernible following the General Election.

Chemical Plant Deliveries. At a joint meeting with A.B.C.M. representatives on the question of delivery dates (which shortened considerably during the year) the B.C.P.M.A. representatives urged that chemical producers should more frequently nominate contractors for projects instead of going out to tender; this method could save considerable time because it enabled discussion of details to take place after, instead of before, the placing of a contract.

It was also suggested that if suppliers of complete plant for unit processes and operations gave the customer a reasonably detailed indication of their purchasing and production programmes for a given job, the customer would be better placed to make a fair assessment of the delivery dates and completion times quoted in the tenders.

Those views were well received by the A.B.C.M. representatives. The contribution that could be made by increased standardisation was also stressed. The committee set up a small sub-committee to review reported difficulties in obtaining prompt and adequate supplies of raw materials.

Guarantees. B.C.P.M.A. members handling large contracts, particularly overseas, were often placed in a difficult position when they had to guarantee a plant for, say, one year from start-up and could not obtain similar guarantees from suppliers of bought-in items. Guarantees normally offered by equipment makers might well be close to expiry when the plant was started up. It was felt that provided the main contractor gave a suitable undertaking in respect of proper handling, storage and putting into service, that the equipment makers might extend their guarantees to 18 months from date of delivery. The views of the British Engineers' Association have been sought.

View on E.F.T.A.

European Free Trade. From the viewpoint of U.K. exports, the E.F.T.A. countries could represent an important market, the size of which was emphasised by the fact that although they imported only £0.45 million of chemical and allied plant from the U.K. in 1958, they imported £7.5 million from West Germany. Despite that it was difficult to visualise the E.F.T.A. materially helping the British chemical plant industry to obtain a greater share of those markets, because, as they were mainly low-tariff countries, the lowering of their tariffs, while favouring the U.K., would not give it any substantial price margin over its competitors from outside the E.F.T.A.

Exports-Imports. Exports of chemical and allied plant in 1959 were valued at £20.17 million (£14.7 million in 1958 and £10.36 million in 1957). The substantial overall increase was almost entirely due to the very steep rise in exports of plastics and rubber-working machinery to the U.S.S.R. In the category 'gas and chemical machinery', the largest consignments were to India, which accounted for 39% of the total.

Highlights of the Report

- **Collaboration is reported on licensing of 'know-how' by chemical firms to plant makers for overseas contracts**
- **Chemical industry capital spending recovered by end 1959**
- **Chemical firms urged to nominate contractors instead of going out to tender**
- **Delivery dates shortened considerably during 1959**
- **Equipment makers urged to extend guarantee periods**

Imports of 'gas and chemical machinery' were valued at £840,000 (£1.28 million in 1958 and £1.41 million in 1957).

Education. Eight member firms now operated schemes for student apprentices and three of those and five other members had schemes for postgraduate trainees that had been approved by the Institution of Chemical Engineers. Four of the firms offered university and technical college scholarships in chemical engineering. While welcoming that progress, the committee felt that the long-term interests of the chemical plant industry demanded a substantial increase in the provision of such facilities by plant manufacturers.

Research. The programme of sponsored research in university chemical engineering departments recommended by the A.B.C.M./B.C.P.M.A. distillation panel proceeded satisfactorily. A similar joint panel had been set up on liquid/solid separation, and two aspects of the subject had been thoroughly studied by working parties; one dealt with the blinding of filter media, and the other with the washing and draining of beds. It is proposed to set up a third joint panel on drying problems.

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I LEARN with interest from Badische-Anilin - and - Soda-Fabrik, something about their Haber-Bosch ammonia process, which is in use at the fertiliser plant under construction near the Aswan dam in Egypt. On completion of the fourth stage next year, it will have a 500,000 tons/year capacity of calcium ammonium nitrate. The product contains 20% pure nitrogen and each ton of nitrogen produces an additional yield of 15 tons of grain.

One ton of grain produces a daily ration of 250-300 grammes of bread for a year for 10 people. The Haber-Bosch process provides 10 million tons of nitrogen a year throughout the world, equivalent to the normal daily bread ration for 1,500 million people—more than a half of the world's population.

This large fertiliser factory is being built by a Franco-German consortium, comprising B.A.S.F., Friedrich Uhde GmbH, Dortmund, and the Compagnie Industrielle des Travaux, Paris. B.A.S.F. took 55% of the contract. First stage was completed in March, the second and third are due for completion in the summer and autumn of this year and the final stage will be on stream early in 1961.

I RECENTLY received further news of the activities of the Chemistry Section of the A.E.A. Technological Irradiation Group, which is still in the process of moving from Harwell to Wantage (CHEMICAL AGE, p. 842). Of interest to the textile industry are the investigations being carried out into the grafting of various monomers on to synthetic fibres with the object of improving dyeability and reducing the tendency to accumulate static charge. Grafting techniques are also being used to reduce the dose required for the vulcanisation by irradiation of natural rubber. It has been found possible to do this to the extent of a factor of 10.

In the field of oxidation, the radiation initiated in both gaseous and liquid phases, particularly in methane and tetralin, is being studied to obtain high yields of intermediate compounds. It is known that if the temperature of oxidation can reduce such yields are obtained.

A fundamental study is being made of the effects of radiation on catalysts, particularly zinc and nickel oxide, in which it is found that radiation has a marked effect.

PRESSURE on space last week prevented me from giving some interesting figures on the research and development cost of the new Proban flame-resistant process. In the Commons adjournment debate, Mr. George Craddock, M.P. for Bradford South, drew attention to the Molony Report which had referred to suggestions that the use of flame-resistant fabrics should be a statutory requirement, at any rate in children's nightwear.

He then spoke of the joint Albright and Wilson-Bradford Dyers' Association company, Proban Ltd., object of which is to co-operate in a research programme aimed at developing a durable flame-resistant process. The company started with a nominal capital of £1,000. From 1954 to 1959 it suffered an accumulated loss of £136,000. In addition, the parent companies have spent a further £170,000 on research and full scale trials of textile machines. That makes a total loss of £306,000 and it is expected that the firms will spend a further £100,000 in the next two years (and not £1,000 as reported in *Hansard*).

Now that Proban have reached the stage when cotton and winceyette can be processed so as to be non-flammable and safe for children to wear, they should be given full marks for the exercise and expense involved. In view of what Mr. John Rodgers, Parliamentary Secretary, Board of Trade, said about the "bitterly disappointing" response to the treated fabrics, it looks as though Proban and the parent companies will have to wait a long time for any substantial return.

NAPHTACHIMIE'S claim that their new polyisobutylene plant now being built at Lavera in southern France (CHEMICAL AGE, 21 May, p. 853) will make them Europe's only producer of this product, is, of course, not true, as it has been imported into this country from Germany for many years.

Badische Anilin-and-Soda-Fabrik AG, Ludwigshafen, have been producing polyisobutylene for about 25 years—as many readers have 'phoned to point out. In fact their U.K. distributors, F. A. Hughes and Co. Ltd., 4 Stanhope Gate, London W.1, were formed at about the time that B.A.S.F. first started making the product.

Naphtachimie are jointly owned by Pechiney and Soc. Française de Petroles B.P., a British Petroleum subsidiary. They will make polyisobutylene under U.S. Cosden Petroleum's licence, which gives Naphtachimie exclusive production rights in the Common Market area.

NEWS that Consolidated Zinc Pty. and Monsanto Chemicals Australia are forming a joint company to make the Isceon range of fluorocarbons in Australia (CHEMICAL AGE, 4 June, p. 929), followed the announcement of a similar joint French-Australian venture. Pacific Chemical Industries Pty. have been set up in New South Wales by Australian Cream Tartar Co. and Ugine of France.

Ugine have licensed this firm to use their process for making fluorocarbons—Pacific Chemical also have a Stuaffer Chemical licence to produce the raw materials for these and similar products. The plants will cost £A800,000 and are expected to be in production next year.

The Consolidated Zinc-Monsanto company is also locating its plant in N.S.W. —at Monsanto's Sydney site. This plant is also expected to be in production next year. The Isceon range is made in the U.K. by Imperial Smelting, a member of the Consolidated Zinc Group. The two projects will give Australia its first fluorocarbons production.

A JAPANESE development which is an example of advanced and, I am told, original designing is described by Mr. Robert H. S. Robertson, the well-known raw materials consultant in p. 953. Of particular interest in the china clay, ball clay and related industries, it is the Hosokawa fine-grinding mill.

Tests were carried out in this country by Northgate Traders (City) Ltd., 36-38 Copthall Avenue, London E.C.2, and Mr. Robertson has had access to results throughout the trials. He says that impurities can be removed from kaolinite clays in a way that "opens new possibilities".

The Hosokawa family is well known in scientific circles in Japan for it founded as an independent research organisation the Hosokawa Micromeritic Laboratory, who publish a magazine known as *Micromeritics*.

FURTHER details reach me of the mile long effluent line laid for Monsanto Chemicals under the Usk estuary (see CHEMICAL AGE, 4 June, p. 909). Before the discharge position 5,000 ft. out in the Bristol Channel, at a point below the lowest predicted tide level, was chosen, Monsanto had carried out work on a model of the estuary at the Hydraulics Research Establishment at Wallingford, Berks.

The steel pipes are protected externally with a bituminous solution reinforced with a woven glass sheathing covered with a 1½ in. layer of reinforced concrete. After welding the lengths into two sections of 2,440 ft., the inside was lined with 15 mil dry-film thickness of a coal tar-base epoxy resin. As it was not possible to coat the tie-in joint internally after welding, stabilised stainless steel sleeves, 18 in. long, were welded to the sections before making the final joint.

A 3 ft. deep trench, about 8 ft. wide at the top was made in the Channel bed by pulling a 100-ton draw bar pull plough through the Channel bed. The discharge end of the pipe is anchored and the whole length is cathodically protected.

Alembic

Chemical Producers Urged to Make Know-how Available to Contractors

B.C.P.M.A. Report and Overseas Licensing

IN response to a request from the British Chemical Plant Manufacturers' Association, the Association of British Chemical Manufacturers in 1959 asked certain of its members to consider seriously making 'know-how' available to plant manufacturers anxious to quote for Soviet projects. This is stated in the annual report of B.C.P.M.A. It is also hoped that U.K. chemical companies will license processes to B.C.P.M.A. members so they can compete in this respect with U.S. and German contracting organisations.

The report refers to the speech at the annual dinner last year, in which the chairman referred to the fact that B.C.P.M.A. members had been precluded from quoting for important projects in the U.S.S.R. and other countries because they could not offer process 'know-how' as well as plant. The committee was glad to hear Sir Walter Worboys, also at the dinner, suggest that U.K. chemical producers who licensed processes abroad had a responsibility to try to ensure that in such cases British plant manufacturers built the installations or played a large part in their design.

The report states "It is most important that British chemical plant contractors should be able to secure the co-operation of British chemical manufacturers so that they can offer plant complete with process."

During the year, although progress had been less rapid than the committee wished, a number of cases of collaboration between members of the two associations was reported. It was hoped that such co-operation would continue and be extended so that the U.K. chemical plant industry was well placed to compete for the increased business "which must come from the many overseas countries which have expanding and developing chemical industries".

State of Order Books

The state of B.C.P.M.A. members' order books reflected the general slowing down of the rate of industrial development over the past 18 months. Capital spending by the U.K. chemical and allied industries, so far as could be judged from the incomplete figures available at the time of preparing the report, was substantially below the 1958 and 1957 levels. By the year end a marked change in the business climate was discernible following the General Election.

Chemical Plant Deliveries. At a joint meeting with A.B.C.M. representatives on the question of delivery dates (which shortened considerably during the year) the B.C.P.M.A. representatives urged that chemical producers should more frequently nominate contractors for projects instead of going out to tender; this method could save considerable time because it enabled discussion of details to take place after, instead of before, the placing of a contract.

It was also suggested that if suppliers of complete plant for unit processes and operations gave the customer a reasonably detailed indication of their purchasing and production programmes for a given job, the customer would be better placed to make a fair assessment of the delivery dates and completion times quoted in the tenders.

Those views were well received by the A.B.C.M. representatives. The contribution that could be made by increased standardisation was also stressed. The committee set up a small sub-committee to review reported difficulties in obtaining prompt and adequate supplies of raw materials.

Guarantees. B.C.P.M.A. members handling large contracts, particularly overseas, were often placed in a difficult position when they had to guarantee a plant for, say, one year from start-up and could not obtain similar guarantees from suppliers of bought-in items. Guarantees normally offered by equipment makers might well be close to expiry when the plant was started up. It was felt that provided the main contractor gave a suitable undertaking in respect of proper handling, storage and putting into service, that the equipment makers might extend their guarantees to 18 months from date of delivery. The views of the British Engineers' Association have been sought.

View on E.F.T.A.

European Free Trade. From the viewpoint of U.K. exports, the E.F.T.A. countries could represent an important market, the size of which was emphasised by the fact that although they imported only £0.45 million of chemical and allied plant from the U.K. in 1958, they imported £7.5 million from West Germany. Despite that it was difficult to visualise the E.F.T.A. materially helping the British chemical plant industry to obtain a greater share of those markets, because, as they were mainly low-tariff countries, the lowering of their tariffs, while favouring the U.K., would not give it any substantial price margin over its competitors from outside the E.F.T.A.

Exports-Imports. Exports of chemical and allied plant in 1959 were valued at £20.17 million (£14.7 million in 1958 and £10.36 million in 1957). The substantial overall increase was almost entirely due to the very steep rise in exports of plastics and rubber-working machinery to the U.S.S.R. In the category 'gas and chemical machinery', the largest consignments were to India, which accounted for 39% of the total.

Highlights of the Report

- **Collaboration is reported on licensing of 'know-how' by chemical firms to plant makers for overseas contracts**
- **Chemical industry capital spending recovered by end 1959**
- **Chemical firms urged to nominate contractors instead of going out to tender**
- **Delivery dates shortened considerably during 1959**
- **Equipment makers urged to extend guarantee periods**

Imports of 'gas and chemical machinery' were valued at £840,000 (£1.28 million in 1958 and £1.41 million in 1957).

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PATENTS REPORT REFLECTS SHARP RISE IN DEVELOPMENT OF CHEMICAL PROCESSES

ACTIVITY in the development of new chemical processes has greatly intensified, judging by the number of new patents recorded in 1959. Figures issued with the annual report* of the Comptroller-General on the work of the Patent Office show that, under the classification of chemical processes, the number of complete specifications relating to the primary feature of the invention which were accepted during 1959 was 303, compared with 152 in 1958. 'Subsidiary' specifications for chemical processes (i.e. those classified in respect of non-primary features numbered 221 as against 181 in 1958.

Very few of the 270 miscellaneous subjects included in the official classifications show increases of this magnitude. However, the continuing rapid increase in activity in the plastics field is reflected in the fact that, under 'resinous polymerisation products', 609 'primary' and 318 'subsidiary' specifications were accepted in 1959, the 1958 figures being 394 and 189 respectively. 'Acetylene' patents also showed a notable increase, from 10 'primary' and 5 'subsidiary' in 1958 to 22 'primary' and 16 'subsidiary' in 1959.

Under the heading of 'hydrocarbons and derivatives thereof, antibiotics,' accepted 'primaries' declined slightly from 1,766 in 1958 to 1,710 in 1959, 'subsidiary' acceptances rising from 214 to 323. 'Disinfecting, medical preparations' rose from 172 to 239 (primary) and from 189 to 335 (subsidiary).

Summarising the trend of invention in 1959, the Comptroller-General recalls that, in the chemical field, the low pressure polymerisation of olefins was further developed, and used to 'tailor-make' propylene, a new plastics material, by choice of catalyst and polymerisation conditions. There was continued activity in organometallic stabilisers for synthetic resin compositions, in organometallic additives for fuels and in organophosphorus compounds for use as pesticides. Among synthetic drugs, steroids were developed having improved physiological properties. In other synthetic drugs, the chief activity was in those for relieving pain, especially in rheumatic conditions, for relieving spasmodic contractions of the muscles, and for lowering blood pressure. Cephalosporin C, a non-toxic penicillin-type antibiotic which is effective against strains of penicillin-resistant micro-organisms has been isolated. There was marked activity in 'reactive dyes', which become chemically combined with the substance of the fibres to which they are applied, and in homogeneous liquid detergent compositions for domestic use.

It is also observed that the materials, construction and loading of fuel elements for nuclear reactors, and the treatment of spent nuclear fuels, received increased attention.

Among the more general matters discussed in the report is the problem of recruiting sufficient Patent Office staff to deal with the rapidly mounting volume of new patents. Although determined efforts have been made to reduce the arrears of unexamined complete specifications, there was still an arrear of 37,068 at the end of the year. If the input continues to rise and cannot be matched by recruitment of staff a very serious situation will arise.

* *77th Report of the Comptroller-General of Patents, Designs and Trade Marks, with Appendices, for the year 1959 (H.M.S.O., 1s 6d).*

Powerful New Poultry Mite Killer Introduced by Boots

COMPLETE eradication of red mite—the most serious of parasites affecting poultry and a major cause of egg losses—has been achieved using a new product of Boots Pure Drug Co., in field trials carried out on infested poultry houses. The new product, now being marketed as Boots poultry mite killer, is based on Sevin (1-naphthyl-*N*-methylcarbamate), a new insecticide of the Union Carbide Corporation, and is produced as a water-soluble powder for use as a spray. It is the result of two years' research by the company's Veterinary Science Division at Thurgarton, near Nottingham, during which some 2,000 new compounds were tested in the laboratories and in the experimental poultry unit.

It is claimed that even a serious infestation can be eliminated within 24 hours at a cost of less than a farthing a bird. In one instance where the infestation had severely depressed egg production a 25% increase was recorded following the treatment.

Some 150 Contributions to Isotope Conference

Selection is announced of 131 scientific papers from 18 countries to be presented at the Conference of Radioisotopes in the Physical Sciences and Industry, which is being organised by the International Atomic Energy Agency in Copenhagen for 6-17 September 1960.

U.K. Chemical Exports to Poland

UNDER the newly signed trade agreement between the U.K. and Poland a number of quotes have been established including one of £110,000 for mineral manufactures. Chemicals are scheduled in a separate list of goods, imports of which are to be facilitated by Poland to the value of about £15 million. These chemicals and pharmaceuticals include:

Oleocetic alcohol, dodecyclic alcohol and other fatty alcohols, ethylene glycol, citric acid, copper sulphate, nickel salts, laboratory chemicals, argon, glycerine, benzoates, rubber chemicals, light magnesium carbonate and oxide, plasticisers, stearine, oleine and other fatty acids, insecticides, etc., melamine, oil additives, synthetic rubbers, picene, sodium cyanide, tin oxide, tricresyl phosphate, radioisotopes, cyclohexamine, textile auxiliaries, lanolin, dyestuffs and intermediates, etc.

Other goods listed include plastics materials, synthetic resins, cellulose acetate, acrylics, film base, chemical and pharmaceutical equipment, platinum gauzes, platinum-rhodium, and automatic data processing equipment.

The U.K. will import from Poland 'chemicals and pharmaceuticals, subject to type,' to the value of £800,000.

Dalapon-based Weedkiller Introduced by Borax

Based on dalapon (α-α-dichloropropionic acid) and intended for the control of rushes, reeds, sedges and similar water weeds, a new weedkiller has been introduced by Borax Consolidated Ltd., Carlisle Place, London S.W.1. It is produced as a water-soluble powder for spray application and, applied in solution at rates varying between 15 to 30 lb./acre, is claimed to eliminate laborious and costly cutting and clearing in drainage operations.

Boots Develop Spray Control For Footrot in Sheep

An aerosol spray to control footrot in sheep has been developed by the veterinary science division of the research department of Boots Pure Drug Co. Called Pedrite, it contains a bactericide and a colouring agent to indicate the exact area of the hoof covered. It is claimed "practically as efficient as antibiotics used against footrot. and much cheaper in use."

40-ft. Canvas Containers for Chemical Dust

Forty ft. high and 12 ft. 6 in. square containers have been made of Scottish flax canvas to contain chemical dust. They were sewn together out of 368 sq. yd. of tough flax canvas. As they are movable and have to be erected on different sites they have to withstand rough usage and weathering. The canvas used was waterproofed and rotproofed, manufactured by the Gourock Ropework Co Ltd., Port Glasgow.

GRAFT-ON POLYMERS SHOW GREATER RESILIENCE SAYS PROFESSOR G. NATTA

THE practical applications of polystyrene are limited by the fragility of the homopolymer at temperatures below those of second-order transition. Compounds containing polystyrene, but with a greater resilience, are known, but have hitherto been obtained mainly by the mechanical mixing of polystyrene and elastomers, or by the polymerisation of styrene in the presence of a non-saturated rubber such as styrene-butadiene rubber. However, the latter method tends to yield reticulated compounds due to the presence of double bonds in the rubber. This is stated by G. Natta, *et al.*, in *La Chimica e L'Industria*, April 1960.

A method of producing polymers of styrene with a high resistance by grafting polystyrene on to either atactic or isotactic polybutene, has been described by Natta, Beati, Severini and Pegoraro. The high-molecular weight polybutene polymer is practically saturated, and thus compounds produced by the method described show greater resistance to ageing than certain anti-shock polystyrenes obtained with non-saturated rubbers.

The hydrogen attached to a tertiary carbon is particularly reactive and hydroperoxides are formed by the action of oxygen on compounds containing such atoms. The presence of such a carbon in each monomeric unit of a high-molecular weight linear polymer of α-olefines enables the formation of hydroperoxide groups to take place by the action of oxygen on the macromolecule. Peroxidation can be used to modify the properties of poly-α-olefines so that a great variety of grafted-on polymers may be prepared.

Hydroperoxide Formed

The hydroperoxides of crystalline and isotactic polymers of poly-α-olefines are formed in the dry state by the action of air or oxygen at temperatures between 70° and 90°C. In the case of polybutene a homogenous peroxidation takes place even if the macromolecules of the polymer used are not fully amorphous.

The polybutene used by Prof. Natta and his co-workers was the residue from the ether extraction of the crude polymer obtained by the stereospecific polymerisation of butene-1. This particular polymer had an isotactic crystallinity of about 50%. The hydroperoxide was produced by passing a current of air through the polymer, used in the form of clots 2 to 3 mm. in size, at 90°C. The current of air contained small quantities of tert. butyl hydroperoxide obtained by the distillation of a commercial product, Trigonox A75, a mixture of 25% hydroperoxide and 75% of tert. butyl. After about 7 hours the active oxygen content reached the required 0.3%. The peroxidated product is washed in acetone and dried under vacuum.

The grafting reaction was carried out by placing the peroxidated polybutene, at a concentration of 12% of the total mixture, together with styrene in a glass vessel and completely removing the air by successive washings with nitrogen. The vessel was sealed with the pressure of nitrogen slightly above atmospheric. The vessels were then placed in a shaking device in a vaseline-oil bath at a temperature of 90°C for 50 hours. The products thus obtained were opaque and white and had shiny surfaces.

Homopolymer Extraction

The grafting-on reaction carried out in this simple manner yields a mixture of the grafted polymer and the homopolymer of styrene in quantities varying according to the conditions of the reaction. The extraction of the homopolymer polystyrene was carried out in a large ball fitted with a blade stirrer. 400 ml. of the solvent, methyl ethyl ketone, was placed in the ball with 2 g. of the polymers produced, the materials being held in a netting made of rustless steel. The ball was immersed in a waterbath at a temperature of 30°C and the extraction was continued for 70 hours.

After extraction of the homopolymer, the granules of the copolymer preserve their form unchanged. After drying, they display under a microscope a structure rich in interstices which materialise during the elimination of the polystyrene. The polystyrene content of the separated products was ascertained by infra red analysis. Extraction made under the conditions described removes two-thirds of the polystyrene and the extracted product consists of polystyrene to the extent of 99%. In spite of the low percentage of polybutene used and the presence of considerable quantities of polystyrene, the raw product shows some interesting mechanical properties.

The table below summarises the properties of some raw grafted products containing homopolymer. The results indicated have been obtained by using as graft-ons, peroxide derivatives of polybutene with intrinsic viscosity $> 1 \times 100$ cm.^{3}/g. and a -O-O- group content ranging from 0.2 to 0.4%. The products with styrene show resistance which is greatly superior to that of polystyrene. It is sufficient to use for grafting a mixture of 12% polybutene and 88% styrene in order to obtain products endowed with high resistance and hardness approaching closely to that met within the most widespread anti-shock polystyrenes. Doubling of the polybutene content yields products endowed with greater resilience but their hardness diminishes to such an extent that their practical interest is negligible.

MATERIAL	Breaking load (traction) kg/cm²	Lengthening at snapping point (traction)	Breaking load (bending) kg/cm²	Elastic modulus at bending kg/cm²	Resilience (Charpy) kg/cm	Hardness ASTM	Softening Point Vicat
Polystyrene $\eta = 0.95$	300	1.2	460	31.100	6.5	L979 Rockwell	95
Polybutene $\eta = 4.5$	310	300	does not break	—	>100	91 Shore A	▼
Mechanical mixture of 12% peroxidated polybutene ($\eta = 1.2$ $O_2 = 0.3\%$) and 88% polystyrene ($\eta = 0.82$) ...	125	13	does not break	22.500	11	L90 Rockwell	87.1
Raw polystyrene grafted onto peroxidated polybutene ($O_2 = 0.43$) Aggregated composition: 12% polybutene and 88% polystyrene	380	2	does not break	24.000	35	L81 Rockwell	92.5
Polystyrene grafted onto peroxidated polybutene ($O_2 = 0.3\%$) exempt from homopolymer ($\eta = 1.7$). Composition: 26.5% polybutene and 73.5% polystyrene	245	3	does not break	8.100	100	L24 Rockwell	92.2

Polymer Technology at Northern Polytechnic

SET out in a publication available from the Northern Polytechnic, Holloway Road, London N.7, are details of courses available in the National College of Rubber Technology syllabus for the coming sessions.

These include a day associateship course for graduates; sandwich courses, an intensive course for science graduates sponsored by, or released from, firms in the rubber and allied industries, and a two-year course for candidates for the Licentiateship of the I.R.I.

1,000 I.C.I. Workers Give Strike Notice

MORE than 1,000 workers at seven I.C.I. plants in mid-Cheshire gave three weeks' strike notice on 7 June. A complete ban was placed on overtime. The men say that their basic wage of about £10 10s a week is below the national average and complain that negotiations between the company and the unions concerned are dilatory.

Last week about 100 members of the Electrical Trades Union at the Runcorn and Northwich plants staged a one-day token stoppage in support of the claim.

Research at Durham

A type EM6 electron microscope installed in the Chemistry Department of King's College, University of Durham, is being used mainly for two research projects. These involve the study of the electro crystallisation of metals, oxides and salts; and the ultra fine structure of carbons.

Calculating Deionised Water Output From Mixed-bed Columns

THE practicability of the various methods available for calculating the output of purified water from a known volume of ion exchange resins has recently been the subject of some controversy. It is therefore of interest to note an empirical formula which has been evolved by Dr. L. Saunders of London University School of Pharmacy, and which is claimed to have proved reliable in field tests over many areas.

The formula is for the calculation of the output of deionised water from a mixed-bed column, assumptions being (1) that the volume of resins is such that capacities of cation and anion exchangers are equal, and (2) that total ionised solids in feed water in p.p.m. of $CaCO_3$ is 150% of the hardness figure given in 'Water Engineers' Handbook'.

If: V = volume of purified water required,

U = volume of wet resin bed,

R = V/U = bed volumes of purified water obtainable,

c_1, c_2 = capacities of two resins (meq/ml. wet resin),

w = total hardness of feed water (p.p.m.).

Then: $$R = \frac{20{,}000 \cdot c_1 c_2}{w(c_1 + c_2)}$$ bed volumes.

The formula comes to us from Elga Products Ltd., Lane End, Bucks, who have reproduced it on a tie-on label. Data are also given showing the quality of effluent obtained after treatment of tap water by various methods. It is claimed that tap water treated by Elgastat Major yielded a quality of 4 million + resistance ohm-cm., as against 2 million after three distillations in quartz, 800,000 + after three distillations in glass and 200,000 after a single distillation in metal.

Analysis of deionised effluent indicated absence of toxic trace metals, chloride, sulphate, or carbon dioxide, while silica was below 0.1 p.p.m. An ammonia test using Nesslers reagent revealed no coloration. The pH value was 6.6-7.

Use of Glycerine in Detergent Manufacture

THE use of glycerine in the detergent industry is the subject of two recent patent applications. The first, involving a high proportion of glycerine derivative in a detergent bar, is described in Australian Application 51,321/59.

A milled and plodded detergent bar comprises 22-40% sodium salt of a substantially saturated higher fatty glyceryl sulphuric acid compound, 3-13% sodium C_{10}—C_{18} alkyl aryl sulphonate (in which the aryl radical is selected from the group consisting of benzene and its substitution compounds), 35-50% alkali-metal soap (of which a major proportion is sodium soap that is predominantly of C_{12}—C_{18} fatty acids of which 40-60% are saturated C_{16}—C_{18}, 10-35% are saturated C_{12}—C_{14} and 5-37% are unsaturated), 6-15% moisture and 2-10% water-soluble alkali-metal sulphates and chlorides. Major proportion of the latter are sodium salts, the amount of sodium chloride present being from 2-7% and that of sodium sulphate being no greater than 5%.

German application 1,074,187 deals with glycerine in a thixotropic liquid detergent composition. The composition consists substantially of a solution of 10% to 25% of an anionic synthetic wetting agent in a preferably aqueous, completely water-soluble organic carrier that has a specific weight higher than 1 and consisting of at least two-thirds of a glycol with up to 4 carbon atoms and/or glycerol. This solution has a viscosity of 0.5 to 2.0 Poise, and a dispersed finely divided phosphate that forms water-soluble complexes with calcium. The phosphate particle size should not exceed about 30μ, and not more than half the phosphate particles should have a size of up to 0.5μ. The ratio between the phosphate and the wetting agent is 1:1 to 4:1. A corrosion-inhibiting silicate can be incorporated.

Chloranilate for Determination of Fluoride

FOLLOWING the success of barium chloranilate as a reagent for the colorimetric determination of sulphate, further research into the general reaction: Metal chlorinalate + anion + hydrogen ion = acid chlorinalate ion (coloured) metal-anion salt has led to the introduction of mercuric chloranilate as a reagent for the mercuric determination of chloride, and lanthanum and thorium chloranilates for the colorimetric determination of fluoride. The lanthanum, mercuric and thorium chloranilates have now been added to the catalogue of the B.D.H. Laboratory Chemicals Division, Poole.

Other additions to the B.D.H. catalogue are acet-ethylamide (*N*-ethyl-acetamide); antazoline hydrochloride (2-(*N*-benzyl-anilino - methyl) - iminazoline hydrochloride); molybdenum disulphide, which in addition to oil for additive applications has been used as a packing material with p.t.f.e. at pressures of 150,000 p.s.i., as a catalyst in the hydrogenation of aldehydes from the oxo process, in the preparation of pure hydrocarbons, hydrogenation of coal or lignite and of lignin mixtures with butadiene or isoprene compounds, the cracking-hydrogenation of heavy petroleum, and in the hydrogenation of esters, ketones and alcohols; *di*-sodium ethyl bis-(5-tetrazolylazo)-acetate for the determination of copper and nickel; and 1:2:3:4-tetrahydro-carbazole.

Duke on Importance of Textile Technology

RESEARCH facilities in the textile industry were adequate for its requirements; the problem today was to convert the output of the research laboratories into commercial advantage through technology declared the Duke of Edinburgh when he proposed the toast of 'The Textile Institute' at the institute's annual dinner at the Dorchester Hotel, London, on 2 June. The importance of scientific research was, he said, more or less accepted in this day and age for any industry that had any wish to live.

The application of science quickly was the key to competition in world markets. Now was the time to worry about getting the fruits of research on to the shop floor. The Duke spoke of his sincere admiration of all that institute had done over the years.

Dr. A. R. Urquhart, chairman of the council, replied to the toast and proposed 'The Guests'. Sir Frederick Handley Page, chairman of the council, City and Guilds of London Institute, responded.

Earlier at the dinner, Lord Derby, president of the institute, admitted the Duke to an hon. fellowship.

Guests at the dinner included: Mr. D. Heathcoat Amory, Chancellor of the Exchequer, Sir Harry Melville, secretary, Department of Scientific and Industrial Research, Mr. S. P. Chambers, Imperial Chemical Industries Ltd., Mr. C. Colton, British Celanese Ltd., Mr. R. E. Huffam, president, British Standards Institution, Prof. J. Speakman, Leeds University, Mr. F. C. Bagnall, British Nylon Spinners Ltd., Mr. F. M. Stevenson, president, Society of Dyers and Colourists, Mr. E. J. Solvay, president, Society of Chemical Industry, Mr. E. Le Q. Herbert, president, Royal Institute of Chemistry.

Gold Medal Award by Market Research Society

The Market Research Society, 197 Knightsbridge, London S.W.1, is to award a gold medal and a prize of £25 to advance the technical standards of market research in the U.K. The award will be for a major written contribution to the techniques, practice and knowledge of market research or allied subjects.

Polythene Nozzle for Fisons Ridweed

The new Fisons aerosol spot weeder incorporates a nozzle moulded in 'Rigidex polyethylene' which enables a dose of weedkiller to be concentrated in a small area. The nozzle is smooth, virtually unbreakable and resistant to the powerful weedkillers used: 2.4 dichlorophenoxyacetic acid and 2.4.5-trichlorophenoxyacetic acid.

Obituary

The Scottish agent of Kestner Evaporator and Engineering Co. Ltd., **Mr. 'Willy' Ferns**, of Fermac and Co. Ltd., died on April 16 at the age of 53. He became Scottish agent for the Kestner Group 15 years ago.

Purifying Kaolinite Clays with the Hosokawa Fine Grinding Mill

By R. H. S. Robertson

Remarkable results have been achieved in the particle size reduction of kaolinite clays using a new fine grinding mill developed in Japan. In this article Mr. Robertson, a consultant, describes the mill.

MODERN industry lays increasing stress on purity and unvarying quality of its raw materials and the supplier is often hard put to it to keep pace with ever-tightening specifications. Twenty years ago paper-coating clays were acceptable with grit contents possibly ten times as great as the limits now specified. But one large particle surrounded by hundreds of thousands of much smaller ones can do noticeable damage by producing faults in printing, by scratching instead of polishing, by settling out of suspensions in awkward places, by increasing maintenance costs of machinery, or by spoiling a well-drawn pencilled line.

The beneficiation of kaolins has been practised since ancient times; Pliny, *Natural History*, **35,** 193, says: "This seems a suitable place in which to remark that all earths should be washed freely with water, and set aside to settle, when they may be made into tablets. The vessels in which they are heated should be frequently shaken"—doubtless to prevent caking. And wet processes of purification remain the chief method of separating china clay in most parts of the world; in this way the crude clay is separated from sand and silt and coarse mica. The product is still something of a mineralogical museum and contains micas of various sorts, fine particles of silica and felspar, anatase, and a number of ferruginous minerals which vary annoyingly in their resistance to bleaching agents.

'Wet' and 'Dry' Processes

In recent years the centrifuge has been introduced into the kaolinite industry in order to make accurate 'cuts' in particle size, both topping ' and ' tailing ' being practised: for some purposes ultrafines should be removed, for others grit removal is more important. But the ratio of capital to output of these machines is undoubtedly a great objection to them, and air as a fluid for separation is more attractive than the relatively viscous water. Water is still the medium for froth flotation, which can be used for removing titania from kaolin, and for chemical bleaching, but the revolutionary design of the Hosokawa fine grinding mill opens up new possibilities of purifying kaolinite clays by the dry method.

Dry milling of these clays has of course been practised for a century or more and in the ball clay industry, where different grades are produced as much by selection as by processing, wet processes are not imposed by the method of getting the raw clay out of the ground. Here the clays are quarried. Their impurities are finer, the micas tend to be hydrous or illitic; there may be wind-blown grit in them while pyrite, lignite and organic matter are frequent contaminants, serious if present in large proportion.

At Osaka, Japan, a new kind of mill and a separator have been designed at the Hosokawa Iron Works Ltd. The fine grinding mill, made in various sizes, makes ordinary hammer mills and cyclones look rather eotechnic, for it combines the following attractive features born of good design. As a fine grinding mill its performance is nearer to that of a fluid energy mill than other mechanical mills; it does not damage the surface of particles tribophysically as a ball mill does; it can be used for grinding harder substances than are usually put through hammer mills and, most remarkably, it separates as it mills.

How the Mill Works

Pre-crushed material is automatically fed to the two-chambered mill; in the first chamber the material is partially ground, in the second, where the runners have a higher peripheral speed, it is reduced to the desired first grist. It is well known that stepwise grinding consumes less energy than grinding in a single operation and here we have two mills for the price of one. Particle size is controlled by altering the sizes of the rings which control the flow of the particles between the first and second chambers and between the second chamber and the outlet, and by the adjustment—from outside the mill-housing—of the clearances of runners, liner and knocks.

Each chamber is provided with an exhaust nozzle through which hard or heavy or large particles, flung to the periphery, are voided at an adjustable rate. In this way anything up to 25% of the material can be removed and one can remove different proportions of matter through the two nozzles. The material thus extracted may be desirable or undesirable; one can imagine tourmaline being thus concentrated, but one knows from experiments made by the importers—Northgate Traders (City) Ltd.—at their experimental station at Billingshurst, Sussex, that undesirable impurities can be removed from kaolinite clays in a manner which opens new possibilities.

One ball clay was contaminated with 17% of free quartz, 90% of which is finer than one micron in diameter. This is a formidable task, but the apparent specific gravity of the nozzle products is so much greater than that of the main product that it was soon evident that a high degree of separation had been achieved. In this run 10% of siliceous impurity was removed by the nozzles, one being half open and the other a third open.

Pyrite is an irregular contaminant in some ball clays; it should either be removed or ground as finely as the clay particles. The former is doubtless the easier operation with the Hosokawa fine grinding mill. Here the settings were arranged for removal of about 2% of the material through one nozzle only.

A ball clay heavily contaminated with lignite looked as if it would defeat any method of separation, but the products of the nozzles are dark and dense and the main product is light in colour and density—apparently the lignite is sufficiently waxy to resist comminution to a greater extent than ball clay. Doubtless control of moisture content would make a further improvement in this remarkable separation. In the trial run, the first nozzle was half open, the second fully open.

Fresh Studies Underway

Studies in milling kaolinite clays at different moisture content have begun at Billingshurst; although it is recognised that there is a ' sticky point ' above which the mill would clog, the mill will function at all moisture contents below this. The lignitic ball clay was milled at 15% of moisture.

Calcined china clay presents a special problem because it is more abrasive than the uncalcined clays. Although the material is to some extent sintered, the aggregated particles are fairly easily broken down to fine powder in this mill and the nozzles remove preferentially the denser and more severely sintered particles. The ratio of heavily sintered to lightly sintered material will be more important in Hosokawa milling than in wet ball milling, and may draw attention to such questions as evenness of sintering.

A general object in these extensive grinding trials has been the reduction of quartz content; this has been achieved in every run, but the quantitative results will not be available until the products have been subject to detailed mineralogical and micromeritic analysis. The impression gained so far is that this mill is of such advanced design that it has permitted a definite break-through in technology to be made in this industry.

New Types of Hose Reinforced with Terylene

SAID to be one of the most significant newer uses being found for Terylene (I.C.I. polyester fibre) is the neoprene hose produced by the Castle Rubber Co. Ltd., of Warrington, Lancs, for the 7 Gev proton synchrotron being built at the Rutherford High Energy Laboratory, Harwell, for the National Institute for Research in Nuclear Science.

Other types of such hose with Terylene inside reinforcement include such outlets as hydraulic brakes, Admiralty refuelling hose, peroxide rocket fuelling hose and that for transporting liquid methane and oxygen.

Plastics Panels Counter Corrosion in Acid Processing Plant

REINFORCED polyester panels have been used in the protective structure of an American acid-processing plant to overcome a formidable combination of heat, humidity, moisture, acid fumes, fertiliser dust and equipment vibration. Felt- and asbestos-covered, zinc-coated panels, previously used, failed after only four years' service.

The plant is that of a prominent mid-western fertiliser manufacturer and the problem arose in a building which houses large rotary kilns and other heavy equipment for grinding and processing fertiliser. Operation of these units caused considerable structural vibration and the building, 90 ft. high and 40 ft. wide, lacked sufficient steel bracing to cope with this factor. Continuing vibration ruptured the protective coating of the original metal panels at fastener points. The resultant capillary action, combined with the cumulative effects of the heavily corrosive atmosphere, soon destroyed the panels.

The answer was found in Fire-Snuf fibreglass-reinforced polyester panels manufactured by Resolite Corporation of Zelienople, Pa. These were made from Hetron 93-LS, a fire-retardant, chemical-resistant polyester resin produced by the Durez Plastics Division of Hooker Chemical Corporation.

Previous successful experience with these panels indicated that they would be suitable for this application but, to make sure, Fire-Snuf panelling was tested continuously for three years by actual plant exposure as well as by immersing sample strips in various acids at various temperatures. Results of these tests, and other factors, led to the decision to clad the walls with this panelling.

Some 19,300 sq. ft. were covered with panels, which were 29 in. wide and in lengths of 7 ft. 6 in .and 11 ft. 6 in. Altogether, some 950 panels and 305 stainless fasteners were used. Before installation, the building was stiffened with steel bracing to counteract the vibration. Also important from the vibration standpoint is the fact that the panels, being plastics, have a flexing action. Also, it is claimed, they provide resistance to the combination of chemicals handled in the process—chlorine, phosphorus, ammonium nitrate—and remain unaffected by moisture, heat and humidity.

Wall louvre equipment, 18-in. gravity-type roof ventilators, flashing, and trim in this installation were also fabricated by Resolite from fibreglass-reinforced Hetron. Plans call for cladding the remaining area of the acid-processing plant (an additional 1,000 sq. ft.) with Fire-Snuf panelling.

Hetron polyester resins are marketed in Free Continental Europe, Australia, New Zealand and South Africa by Albright and Wilson (Mfg.) Ltd., 1 Knightsbridge Green, London S.W.1, and in the Western Hemisphere by Hooker Chemical Corp., 666 Fifth Avenue, New York 19, N.Y.

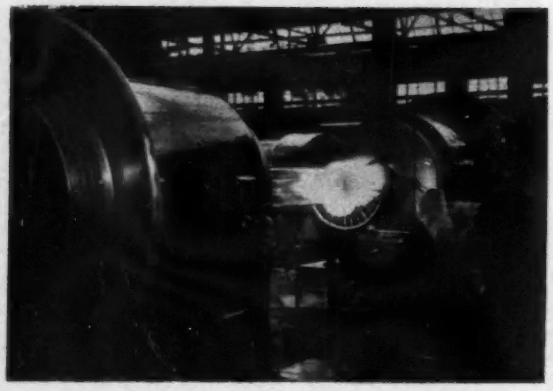
World's Largest Glass-joining Lathe

WHAT is claimed to be the world's largest glass-joining production lathe has been installed at the Stone, Staffs, factory of Quickfit and Quartz Ltd., manufacturers of interchangeable laboratory and chemical glassware.

Designed by Q. and Q. in collaboration with Heathway Engineering, Hillingdon, who constructed it, the lathe has a capacity through head and tail stocks for taking pipeline of more than 15 in. diameter. It thus enables longer lengths of pipeline to be handled in the factory.

This lathe was designed to join longer lengths of 12-in. pipeline which can be accommodated through head and tail stocks. In addition, special 'U' bends, up to the present maximum 18-in. diameter, and 200-litre flasks with special side arms, can also be handled between the face-plates. The lathe has capacity for dealing with even larger glassware contemplated by Q. and Q. for the future.

The lathe will be used to manufacture industrial glassware for the associated firm in the Tilling Group, Q.V.F. Ltd., chemical engineers in glass, Fenton, Stoke-on-Trent.



The new Q. & Q. glass-joining lathe in operation

Plastics Open Day at Rubber Laboratories

A TARGET of £30,000 raised from the plastics industry would allow an adequate start to a joint rubber and plastics research association, declared Dr. W. F. Watson, director of research, at the plastics industry open day of the Research Association of British Rubber Manufacturers, at Shawbury. He added that the R.A.B.R.M. council had agreed to the start of about half the envisaged extensions and already had funds or some £60,000 for that part of the extensions. These were going ahead largely to meet the need for research into thermoplastic materials for the benefit of present members.

Second stage of the extensions had in the mind the time when the laboratories would truly represent both the rubber and plastics industries.

Mr. David Radford, chairman of the British Plastics Federation, urged the plastics industry to participate in a joint research association. He pointed out that the U.K. rubber industry had an annual turnover of some £100 million; the plastics industry now had an annual turnover of more than £150 million, but still did not have its own research organisation, although the larger companies spent enormous sums on their own research.

Major Advance Claimed in Ion Exchange Resins

A NEW series of ion exchange resins, said to represent "an entirely new concept in polymer chemistry", has been developed by Rohm and Haas, Philadelphia. The first of the new series to become commercially available is Amberlite 200, a high capacity, strongly acidic cation exchange resin.

Introduction of Amberlite 200 is claimed to be the first major advance in synthesis of cation exchange resins since polystyrene type resins became available in 1946. Although Amberlite 200 is a sulphonated styrenedivinylbenzene copolymer as are the standard resins, it possesses "extraordinary chemical and physical stability" that has been achieved by major changes in resin synthesis.

The new resin is particularly recommended for use in treating water supplies that cause conventional resins to decrosslink; for the 'hot lime-zeolite' process; for rejuvenation of plating solutions; for sugar processing and in mixed-bed (Monobed) deionisation. It is also suggested for use in the treatment of highly aggressive solutions or where high operating temperatures are involved.

Additional information is available from Rohm and Haas Co.'s U.K. subsidiary Charles Lennig and Co. (Great Britain) Ltd., 26-28 Bedford Row, London W.C.1.

Will

Mr. Harold Tongue, C.B.E., chief engineer to the Atomic Energy Research Establishment, Harwell, from 1946 to 1954, who died on 18 February, left £6,064 net.

Overseas News

NETHERLANDS CHEMICAL SALES TO DOUBLE IN SEVEN YEAR PERIOD

TURNOVER of the Dutch chemical industry is estimated for next year at Fl.3,500 million, or some £340 million, as against a figure for last year of some 3,000 million florins, it was announced in Rotterdam at the annual meeting of the national chemical association, Vereniging van de Nederlandsche Chemische Industrie. The 1961 figure would be double that of the 1954 turnover, it was stated. Compared with 1939, annual chemical turnover had risen from 230 million florins to 2,950 million florins and chemical exports from 90 million to 1,250 million florins. The body's chairman, Mr. D. de Jong, contradicted the opinion of the annual meeting of the other main chemical association (Katholieke Vereniging van Ondernemers in de Chemische Industrie) earlier this year, that development was not running at a sufficient level.

Statistics of turnover and exports in the main branches of the country's chemical industry in 1959 were also revealed at the meeting. Their source is partly the national statistical office. Centraal Bureau voor de Statistiek, and partly the V.N.C.I. itself. They contained the following figures:

Products	1958 (in million florins) turnover	1958 (in million florins) export	1959 (in million florins) turnover	1959 (in million florins) export
Synthetic fertiliser	440	226	450	234
Plastics	250	122	290	166
Rayon & syn. fibres	260	163	300	214
Pharmaceuticals	230	121	280	145
Pigments, dyestuffs	80	51	85	58
Gases and carbide	45	7	45	6
Cosmetics etc.	60	23	70	54
Various heavy chem. products	290	120	360	170
Various light chem. products	390	259	430	295

Israeli Chemical Firm Steps Up Output

Annual output value of the Israeli concern Fertilizers and Chemicals Ltd., estimated at £125 million for 1959, is expected to rise to £133 million in 1960-1961 at the end of the current expansion plan.

Cathodic Protection for Soviet/Hungary Oil Line

Prevention of corrosion for 45-50 years is expected for the oil pipeline now under construction in Hungary, which will carry fuel oil all the way from the Soviet Union. On the basis of extensive preliminary research work, it has been decided to use cathodic protection on the Hungarian sector of the line, the research having been carried out by Veszprem Chemical Industry Research Institute.

At present one-third of Hungary's requirements in oil come from her own fields, the remainder being transported from the U.S.S.R. With completion of the line it is hoped to save between £5 and £10 million a year in transport costs alone.

The new refinery at Szazhalombatta will be capable of processing up to 3 million tons/year of oil, using automation methods. Work is due to begin this year on a new power station, the biggest in Hungary, to supply electric and steam power for the refinery.

Rumania Experiments with Epoxy Resins

With a view to producing epoxy resins on an industrial scale, experimental work has been carried out at the C Istrati factory, in a plant built after designs by Icechim (Institute for Chemical Researches). The plant will supply adhesives and casting epoxy resins as well as resins for lacquers.

Industrial production of hard and plasticised vinyl foams, in a form said to be lighter than cork, is also being organised by Icechim. The new products will largely be used for thermic and sound insulation in the furniture industry.

Shell Hydrodesulphuriser Project in Canada

A distillate hydrodesulphuriser, which, with its auxiliary equipment, will cost some $3 million, is to be built at the Montreal East refinery of Shell Oil Company of Canada Ltd. Construction will start early in July with completion scheduled for December. A contract for the work has been awarded to Canadian Bechtel Ltd.

The operation, called 'trickle-phase' hydrodesulphurisation, employs a special Shell process designed to reduce the sulphur content of distillate in the production of fuels of extra high quality for diesel, heating oil, and aircraft applications.

Big Expansion of Nylon Yarn Output in Australia

A joint company is being formed by Allied Chemicals Corporation, U.S., and Polymer Corporation Proprietary (Australia) to produce initially nylon tyre cord monofilament and moulding compounds, and later "a range of chemicals."

The £A2 million plant, which it is proposed to erect in Sidney, will have capacity to meet all current Australian demands for nylon tyre cord, and most of the plant is expected to be made operational within a year.

The announcement follows a decision of British Nylon Spinners to expand their nylon yarn spinning plant at Bayswater, Victoria, at a cost of £A5 million, doubling the company's investment there. It was also announced that B.N.S. prices for some main yarns would be reduced immediately.

French Plastics Production

Production of plastics last year in France amounted to some 260,000 tonnes, or 24% more than the 1958 output of about 210,000 tonnes. Plastics exports rose from 17,000 tonnes in 1958 to 33,000 tonnes last year, while imports fell from 39,000 tonnes to 37,000 tonnes. Production of polythene over the year rose from 7,800 tonnes to 17,800 tonnes, with the bringing into operation of a second production unit.

Italian Chemical Exports Increased

The general report prepared for the general assembly of Aschimici reveals that in 1959 the output of Italian chemical industry showed an increase of 19.4% over 1958.

Of the 2,133,027 tons of sulphuric acid produced, 1,129,058 tons were produced by the 'contact' and 1,003,979 tons by the 'chamber' method. Output of ammonia (740,000 tons), derivatives of sulphur and fluorine, sodium and chlorine products, and phosphorus and its derivatives also showed good increases. Drops in the output of calcium nitrate and calcium cyanamide were more than counterbalanced by increases for ammonia sulphate and ammonia nitrate.

Italian chemical exports for 1959 totalled 138,000 million lire, 26% more than in 1958, while imports increased only by 12%. The increase in exports was due mainly to chemical fertilisers (41%), organic chemicals (30%), plastics materials (27%) and perfumery (19%).

U.S. Army Tests New Fireproof Rust Preventive

An all-purpose fireproof rust preventive to replace petroleum-base solvent types, has been developed in the U.S. and is described in a U.S. Army report (PB 161,352, available from the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C., price $2.25). An emulsifiable rust preventive was selected for testing. Specifications called for a maximum pour point of 32°F, moisture content under 8%, no separation from 0 to 82°F, no gelling between 72 and 82°F, and more than one year shelf-life from 50-110°F.

The preventive also had to be anti-corrosive, protecting metals against continuous moisture condensation up to

120°F, protecting oil and grease up to 180°F, plus protection against a 20% salt spray up to 95°F. The test report met these specifications and is also free of disagreeable odour and can be removed with naphtha and methanol cleaners.

Israeli Phosphates for Japan

Israeli phosphates are likely to win a permanent share of the Japanese and other Far Eastern markets due to the success of a trial consignment of 29,000 tons, shipped to Japan several months ago. A follow-up order of 30,000 tons was shipped out last month.

It is understood that the competitive price of the Israel product, together with its consistently high and uniform quality, has had a decisive influence on the Japanese importers.

A new road is being built southwards from the Oron Phosphate Works towards Ein Yahav, and will shorten by 70 km. the 236 km. run from Oron to the Red Sea port of Eilat.

Finnish Chemical Firm's Expansion Plans

The Finnish Parliament is considering a recommendation under which Government guarantee would be granted to the State-owned chemical concern Rikkihappo ja Superfosfaatitehdas Oy to raise a foreign loan of up to 1,200 million Finnmarks, this guarantee to last until the end of 1962. The loan would finance the expansion of the sulphuric acid capacity at the company's Gamlakarleby plant from 45,000 tonnes/year to 120,000 tonnes/year, raising the total annual capacity of sulphuric acid of the concern to some 250,000 tonnes. The necessary investments would total 2,360 million Finnmarks.

Allied Chemical Expand Methyl Anhydride Output

Facilities for the production of Nadic methyl anhydride, a liquid epoxy curing agent, have been expanded by Allied Chemical, U.S. The product is said to impart superior strength properties, producing high heat distortion points and lengthening the pot life of the compound in which it is used.

International Congress on Chemistry

An international congress on analytical chemistry is to be held from 16 to 21 May 1961, in Budapest, at which all fields of analytical chemistry will be handled. Organisers are the Association of Hungarian Chemists and the Hungarian Academy of Sciences: From 15 to 17 June 1960, an international chemical machinery conference is being held in Budapest.

Canadian Tariff Board Plans Nine Hearings

A series of nine hearings in the next 17 months has been scheduled by the Tariff Board as the opening phase of its study of the Canadian chemical industry. Listed for the hearings are a large number of inorganic chemicals. The board will follow generally the proposals of a chemical industry committee for a breakdown of the study into groups of chemicals for review at individual hearings.

The first nine hearings, in Ottawa, are scheduled for 12 and 26 September, 7 and 21 November, 9 and 23 January, 6 and 20 February, and 6 March. The board has asked that proposals for tariff changes be submitted 60 days in advance of the particular hearing. The industry committee will publish its detailed proposals for tariff reductions by 14 July.

Norwegian Firm Expands Magnesium and Urea Production

Total output of nitrogenous products by Societe Norvegienne de l'Azote, Oslo, Norway, for 1959 was "very satisfactory" and reached a new record level of 242,100 tons, an increase of 11,500 tons over the previous year's total. Nitrate lime production was slightly higher, but output of ammonium nitrate was relatively low.

Total production of these products attained 1,100,000 tons and 41,000 tons respectively. Output of urea rose again from some 42,000 tons to 58,000 tons.

Du Pont Place New Sulphuric Acid Plant Contract

The Chemical Construction Corporation, New York, have received a contract from Du Pont De Nemours and Co. to design a single train equipment unit sulphuric acid plant at La Porte, Texas. The plant is scheduled for completion in 1961. Chemico will provide engineering, specifications and equipment, while construction will be handled by the Du Pont Engineering Department.

Austrian Chemical Output Figures Rise

Chemical output figures for last year in Austria include 43,000 (30,000) tonnes of plastics, 51,000 (46,800) tonnes of rayon wool, 919,000 (852,000) tonnes of synthetic fertilisers, 40,100 (38,100) tonnes of paints and lacquers and 58,000 (55,800) tonnes of soap, washing and cleaning media and detergents.

Norwegian Exports of Carbide

Some 58,900 tonnes of carbide worth 39 million crowns (£1.95 million) was exported by Norway last year, together with quantities of cyanamide and dicyanamide, according to the Oslo newspaper, *Morgenbladet*. Total carbide capacity at present is some 80,000 tonnes/year. Other chemical output figures for 1959 include 535,000 tonnes of sulphite cellulose, of which 276,000 tonnes went for export, and 143,000 tonnes of sulphate cellulose, 24,000 tonnes of which was exported.

U.S. Monsanto Co-operate in Belgian Polyvinyl Butyral Plant

A plant for the production of polyvinyl butyral foils is to be built at Ghent, in Belgium, by a company just formed as a joint subsidiary of Monsanto Chemical Co., U.S., and the Belgian concern, Soc. Industrielle de la Cellulose S.A. Erection of the factory, which will work to the Monsanto process, is to start immediately for completion next year. Monsanto already hold a minority share in Soc. Industrielle de la Cellulose.

Production of Glutamic Acid and Salts in Italy

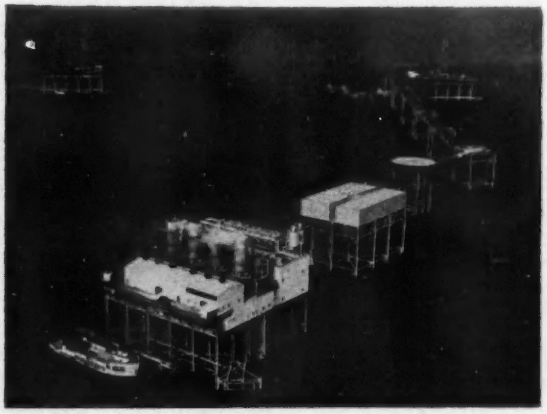
Five companies in Italy are engaged in the production of glutamic acid and monosodium glutamate. These are Aminochema (Milan), Distilleria di Cavarzene (Padua), Distilleries Habane (Milan), Flamma (Bergamo) and INSAPA (Fontanellato).

Aggregate potential of the above companies is stated to amount to 3,500 tons a day with actual output of about 70% of this total, i.e., 2,400 to 2,600 tons.

Sale price of glutamic acid is between 1,900 to 2,500 lire a kilogramme and the monosodium salt between 1,300 to 1,500 lire a kilogramme.

From 1,500 to 1,700 tons of output is consumed in Italy and some 700 tons are exported.

Freeport Sulphur's Off-shore Mine



World's first off-shore sulphur mine, where operations were recently started (C.A., 9 April, p. 608). Seven miles off the Louisiana coast, this 1¼-mile long structure is over the main part of Freeport Sulphur's Grand Isle sulphur deposit. Drilling and production platform is at the far end; separate drilling installation at the left sinks wells to relieve the ore body of excess mine water

Second and Improved Edition of Electrolyte Solutions

ELECTROLYTE SOLUTIONS. 2nd Edn. By *R. A. Robinson* and *R. H. Stokes*. Butterworths, London, Academic Press, New York, 1959. Pp. xv + 559. 63s.

As this is the second edition of the work with which all practising electrochemists are familiar, a detailed introduction to the text is not required. In revising the first edition the authors have been cautious in departing from it. Nevertheless they have taken note of many comments received from those who have used the original and a variety of trivial errors have been corrected, resulting in worthwhile clarification.

Despite the incorporation of a good deal of new material the new edition is only some 50 pages longer (and only slightly more expensive) than its predecessor. This has been achieved by careful pruning: for instance, in the section on ionic distribution functions, the appraisal of Bagchi's treatment is no longer warranted; however the criticism of Eigen and Wicke's more significant approach is rightly retained. Major changes are made in Chapter 7, on the variation of conductivities and transport numbers with concentration. Here, the account of conductivities in non-aqueous solvents is extended, while the treatment of concentrated solutions is deferred to Chapter 11, on the theory of diffusion, where a more detailed account of viscosity is made.

The tabular material in the appendices is revised and greatly extended: Appendix 12, which mainly concerns the ionisation of weak electrolytes, is thus increased from 11 to 30 pages. Everywhere, the authors have made strenuous efforts to bring their book up to date and they (together with their publishers) are to be complimented on including, as an appendix, a brief exposition of Fuoss' theory of ion-pair formation (1958). The chapter on the 'strong' acids has benefited from the Faraday Society discussion (1957). The index, a weak part of the first edition, is improved.

J. P. G. FARR

Aluminium Cladding for Spondon Steam Main

ALUMINIUM sheet has been used to clad a steam main at the Spondon works of British Celanese Ltd. and is claimed to give lasting, maintenance-free protection from the weather. The main, a steel pipe of 30 in. bore and over 2,000 ft. long, delivers steam from a nearby power station. The system also includes some 1,300 ft. of branch pipes.

All the insulated pipes in the system were protectively finished with 'Noral 2SH' sheet (0.036 in. thick) supplied in coil form by Northern Aluminium Co., Banbury, Oxon. Seven tons of aluminium were needed in all, but on the largest pipe the cladding weighed only a little over 4 lb. per ft. and its lightness enabled savings to be made in the supporting structure. The insulating engineers were Thomas Cotton Ltd. of Mansfield, Notts.

Chemist's Bookshelf

MASS SPECTROMETRY PROGRESS

ADVANCES IN MASS SPECTROMETRY. Edited by *J. D. Waldron*, Pergamon, London, 1959. Pp. xiv+704. 120s.

A conference on mass spectrometry was held in London in 1958 under the joint auspices of the Hydrocarbon Research Group, Institute of Petroleum and the A.S.T.M. Committee E.14. The papers presented at this conference and extracts from the discussion have now been published in an impressive volume. Both the calibre of the authors and the quality of the papers are high. The range of subjects covered by the contributors is wide. On the one hand, there are papers concerned with the difficulties and problems associated with the design of modern mass spectrometers such as those with high resolving power or possessing other desirable features like rapid response or the capacity to handle solid substances. At the other end of the scale, there are papers dealing with the applications of mass spectrometry to the study of geology and to the analysis of the gases in meteorites. Despite the diversity of the subjects covered, there is a great deal of interest to the chemist in the volume and it is surprising how many different branches of chemistry have been successfully studied by mass spectrometric techniques.

The analysis of mixtures of vapours and gases by mass spectrometry is well established but many new extensions of the analytical possibilities of the technique are described. The analysis of solids is an important development which results from the new types of spectrometer now available. Other papers describe the design of a mass spectrometer suitable for the estimation of corrosive gases and the advantages that can be gained from the use of rhenium filaments in place of the more normal tungsten filaments for handling certain classes of compounds. Another important development is the application of high resolution mass spectrometry to the identification of ions of closely similar mass which may well develop into a valuable method of determining the composition of organic molecules. The ability of such instruments to distinguish between ions like N_2^+ $C_2H_4^+$ and CO^+ all with nominal mass of 28 raises a number of interesting possibilities.

Many of the papers describe new work on the study of the reactions between ions and molecules in the spectrometer and also on the more well-established topic of electron impact phenomena—the reactions between the ionising electrons and molecules. Other papers deal with recent applications of the mass spectrometric technique to the determination of bond energies and to the study of the radicals formed on hot metal surfaces.

A novel feature at the end of the volume is a bibliography of the subject covering the period 1938 to 1957, compiled by the research department of Metropolitan-Vickers Ltd. and comprising some 2,000 references. The book is well-produced and the standard of the diagrams, etc., is high. So is the price, but nevertheless the volume is valuable because it gives a comprehensive and authoritative account of the state of this rapidly developing subject in 1958.

C. KEMBALL

Reactions of Elements and Compounds

ENCYCLOPEDIA OF CHEMICAL REACTIONS, VOL. VIII. Compiled by *C. A. Jacobson et al.* Edited by *C. A. Hampel*. Reinhold, New York, Chapman and Hall, London, 1959. Pp. vii + 533. 112s.

Volume VIII is the last in this compendium of the reactions of the elements and their simpler compounds. The elements primarily covered are: tungsten, uranium, vanadium, ytterbium, yttrium, zinc and zirconium, but 195 pages are devoted to other elements, some reactions of which have been unearthed from older literature or newly described since their publication in earlier volumes. The style and system are essentially similar to those of the previous books in this series save that entries are arranged purely alphabetically: this has some advantage in that any one type of compound is to be found *en bloc* instead of disseminated because the individual members of a group contain different numbers of atoms.

By definition, the book is telegrammatic and completely uncritical: under each entry (of which there are 1,850) is a very brief description of the reaction followed by a chemical equation which is believed to describe the stoicheiometry, and one (rarely more) reference. Nevertheless, the lay-out of the book is extremely uneconomical in that there is an average of just under four entries on each effective page. A reader will be startled by the dates of some of the chosen references: surely more detailed and more useful work on some of the reactions has been carried out since the 19th century? The book is very weak indeed in the reactions of organic compounds, particularly chelating agents, with the ions of the metals covered.

D. A. PANTONY

R.I.C.'s Third Monograph

"Principles of the Extraction of Metals" by D. J. G. Ives, is the title of the third item in the series of monographs for teachers published by the Royal Institute of Chemistry. Copies, price 6s each, can be obtained from the Institute, 30 Russell Square, London W.C.1.

Chemist's Bookshelf

Boron Fluoride in Catalysis

BORON FLUORIDE AND ITS COMPOUNDS AS CATALYSTS IN ORGANIC CHEMISTRY. By *A. V. Topchiev, S. V. Zavgorodnii,* and *Ya. M. Paushkin.* Translated by *J. T. Greaves.* Pergamon Press. 1959. Pp. 326. 80s.

This volume is the second of the international series of monographs on organic chemistry, published under the joint general editorship of W. Doering. and D. H. R. Barton. The inclusion, early in the series, of a work by members of the U.S.S.R. Academy of Sciences, is a tribute to the authors consistent with the international character of these monographs. The choice of subject undoubtedly reflects the strong current interest in industrial catalysis, particularly in the petroleum industry, where catalysts of the boron trifluoride type have been used with success in recent years.

With the commercial production of boron fluoride and its etherate in the U.S. in 1936, the volume of boron fluoride as a catalyst for a wide range of reactions became universally evident. The employment of boron fluoride as a catalyst in industrial processes continued to be retarded by the high price of the reagent and recovery difficulties. Despite the difficulties, the use of boron fluoride as an industrial catalyst appears to be growing, as is evident from the very numerous patent references quoted in this book.

Several comprehensive monographs devoted to boron fluoride are already available. In these circumstances the inclusion of much familiar material must be recognised in the present work; at the same time the authors have written with considerable authority from the technological point of view. The book is undoubtedly a valuable guide to the patent literature, which is largely American and Russian. Recent chemical developments in the alkylation and cracking of hydrocarbons are discussed at some length, in the light of the authors' own contributions to the field. Of particular interest are facts about the activation of aluminium silicate catalysts by boron fluoride. Technology apart, a great deal of the fundamental organic chemistry of boron fluoride is discussed.

A chapter about the boron hydrides has been properly included, in which the unsaturated character of these derivatives, and their similarity to boron fluoride is strikingly evident. On the other hand section describing the physical chemistry of boron fluoride appears to be somewhat inadequate. and lacking in physical data. The addition of an author index would add to the value of the book, the production of which is of excellent quality.

J. H. TURNBULL

Progress in Organic Chemistry

ORGANIC CHEMISTRY. Vol. II. Stereochemistry and the Chemistry of Natural Products. By *I. L. Finar.* 2nd edn. Longmans, Green, London, 1959. Pp. xi+834. 45s.

Progress in all aspects of organic chemistry continues unabated, and many of the most recent devlopments are included in the present volume, which represents an extensive revision of the first (1956) edition. The general plan of the book is unaltered; the first six chapters are concerned with stereochemistry and related theoretical aspects, and the remaining thirteen chapters contain a systematic survey of the various groups of natural products.

The revision has entailed the addition of more than 100 pages of expanded or new material. The chapters describing the physical properties and chemical constitution of organic compounds, and optical isomerism have been enlarged and the sections dealing with many biologically important compounds, e.g., ascorbic acid, cholesterol, polypeptides, and certain antibiotics expanded. The most important additions concern conformational analysis as applied to both the stereochemistry of cyclohexane and the steroids, and on the course and rate of chemical reactions, and the biosynthesis of organic compounds. Other new topics include nuclear magnetic resonance, the correlation of configurations, isoflavones, vitamin B_{12}, aureomycin and terramycin.

The accounts of the various classes of natural products are generally excellent (although in some cases, historical aspects are over-emphasised), and it is clear that the author has made a real attempt to be up-to-date; for example, Calvin's photosynthetic scheme, the steroid synthesis by Woodward, Robinson and Johnson, and literature references to 1957 and 1958 are included. However, no reference is made to aldosterone—surely the most exciting discovery in steroid chemistry for many years.

Although several examples of the biosynthesis of organic compounds are discussed, the treatment is not entirely satisfactory; for instance, the importance of mevalonic acid as a precursor for terpenes and steroids, and the general implications of the acetate theory of biogenesis of other aromatic compounds are not mentioned, whilst the biosynthesis of proteins and purines are each discussed in one short paragraph containing only a single obsolete reference. These comments illustrate the difficulties which are faced by authors of advanced textbooks; no single author can expect to have a detailed and specialised knowledge of all aspects of the subject, while multi-volume treatises produced under multiple-authorship are not suitable for *teaching* purposes for the honours degree student. Some minor inaccuracies have been noted: maltase hydrolyses α-glucosides, not α-glycosides, and has no action on non-reducing sugars of the trehalose-type (p. 259), β-amylase and diastase are not synonymous (p. 277), and the nomenclature of some enzymes (e.g. phenolase. nucleinase) is incorrect.

Each chapter is followed by a bibliography containing some 20-30 individual references, but the value of this is reduced by their heterogeneous nature, covering text-books, review articles, and individual papers.

To summarise, this volume provides, at a most moderate price, a modern and balanced account of stereochemistry and the chemistry of natural products, and can be strongly recommended.

D. J. MANNERS

Gas Purification Processes Reviewed

GAS PURIFICATION. By *A. L. Kohle* and *F. C. Riesenfeld.* McGraw-Hill, London, 1959. Pp. x + 556. 16s 6d.

This book is a comprehensive review of the processes used in gas purification with particular reference to processes operated in America, although some account is given of European operations. In the introductory chapter the basic principles of absorption and adsorption are discussed with brief reference to the theory of mass transfer operations involving diffusional processes. Subsequent chapters deal with specific processes in relation to the removal of a given gas, or gases, or to various types of process.

Thus, Chapters 2 and 3 deal respectively with the removal of carbon dioxide and hydrogen sulphide by the employment of ethanolamines. The first section is devoted to chemical, design and operating features, while the second part deals with the mechanical design and operation of such plants. But, in fact, most of the last section deals with corrosion problems.

The remainder of the book is devoted specifically, to other processes, as for example. removal of hydrogen sulphide and carbon dioxide by ammonia solutions, sulphur dioxide removal, dehydration processes, the recovery of basic nitrogen compounds with particular reference to ammonia, etc.

The book is well written and illustrated. Wherever possible considerable design and operating data have been included, with particular emphasis on experience in America as far as costs are concerned. This contribution to the literature will be well received by all connected with the gas industries.

Each chapter has a separate bibliography, and in all there are references to some 600 original contributions to the literature. There is a good author and subject index at the end of the book.

E.J.C.

£4,400 for Leeds Department of Physical Chemistry

Leeds University's Department of Physical Chemistry has received a donation of £4,400 over two years from the General Electric Co, U.S., for research; and £546 from I.C.I. for the purchase of a signal generator.

Six Reviews on Chromatographic Methods

CHROMATOGRAPHIC REVIEWS. Vol. 2. Edited by *M. Lederer:* Elsevier, Amsterdam, 1960. Pp. VIII+195. 46s.

Nowadays most research chemists use some forms of chromatography in their work, but the technique has so many ramifications that few people will have experience of more than part of the field. This book contains six reviews on different branches of chromatography reprinted from the *Journal of Chromatography*. The topics are so diverse that most reviewers will probably largely confine their comments to articles on those subjects with which they are best acquainted—in this case, the article on gas chromatography by Hardy and Pollard.

This article was a complete survey of the chosen parts of the topic when it was written about two years ago. (It is a serious fault that a review article should contain no explicit indication of the date at which the literature survey was completed.) The article occupies slightly less than one-quarter of the book and includes 619 references. The authors have cleverly contrived to make the inevitable catalogue much more readable than might have been expected. It is no fault of theirs that the treatment is badly out of date. There is no mention of capillary columns and little of the best super-sensitive detectors.

The editor and publishers should consider whether it is worth while to reprint articles in such rapidly moving fields, and also whether many individuals will want copies of a sufficient proportion of the articles to be prepared to buy these rather expensive books.

A. F. TROTMAN-DICKENSON

Electronic Computors For Businessmen

ELECTRONIC COMPUTERS AND THEIR BUSINESS APPLICATIONS. By *A. J. Burton* and *R. G. Mills*. Ernest Benn, London. 1960. Pp. 325. 45s.

It was the early 1950's that heralded the business computer in the shape of a punched card electronic multiplier; delivery of full-scale electronic computers designed for business use started in the U.S. in 1953 and in this country as recently as late 1956—just as the lectures on which this book is based were commencing. These highly successful lectures at Sir John Cass College, London, were attended by over 1,000 students including executives.

It has been assumed by the authors that readers have no previous business computing experience.

Appendices include the names of companies marketing business computers in Great Britain with 18 plates illustrating parts and accessories; a specification of Casseac; ancillary equipment; programme flow-chart symbols; and automatic coding by the recently introduced comprehensive Codel system.

N.C.

Chemist's Bookshelf

TRANSURANIUM ELEMENTS

THE TRANSURANIUM ELEMENTS. By *Glenn T. Seaborg*. Methuen, London, 1959. Pp. 328. 50s.

This book is an enlarged version of the Silliman lectures given by the author at Yale University in May 1957. The four chapters bear the titles of the individual lectures: The plutonium story; Chemical properties of the actinide elements; Nuclear properties of the transuranium elements; Future synthetic elements. Within the two chapters on chemical and nuclear properties, a valuable review of topics already filling many books is presented.

The transuranium elements belong to a transition series which begins at actinium (number 89) and occupies a similar position in the periodic classification to the familiar rare earth series. The author has chosen to draw on this form and discuss the wealth of information in correlative manner within the series. In many places the second and final chapters read like a detective story in which the periodic table is the key clue. The techniques for separating the new elements are largely dependent on ion exchange methods. For this, advantage is taken of the resemblance in behaviour between the actinide and lanthanide elements when in the tripositive oxidation state.

Elements 99 and 100 were first discovered in debris from a thermonuclear explosion of November 1952. In the extremely high neutron flux of the fusion device as many as 17 neutrons were added to uranium atoms. By working tons of the coral from atolls adjoining the explosion area identifiable quantities of einsteinium and fermium were obtained. (Today the use of the high-flux materials testing reactor permits of their more controlled production!) The final chapter tells of the techniques for identifying a 'handful' of atoms—and the possibility that 104 and 105 will live long enough to permit traditional chemical identification. Chemistry and physics merge.

One danger in this book is that the lists of names associated with the projects become so tedious (particularly in the plutonium story—the first 111 pages) that the reader is sorely tempted to close the book. Braving this, he will find much of historic interest. The breadth of the original research effort was amazing. The pyrometallurgical processes which still hold much promise were considered at the first. The plutonium story extends to the inclusion of neptunium, americium and curium and photographs of the first compounds of each are reproduced. The whole bears eloquent witness to the excellence of micro techniques.

J.S.M.B.

Analytical Chemistry and Titanium

THE ANALYSIS OF TITANIUM AND ITS ALLOYS. 3rd Edn. Published by I.C.I. 21s.

The anonymous group of I.C.I. analysts who compiled the third edition of this useful text are once again to be congratulated. This work follows the basic design of the earlier editions as a laboratory handbook, and describes the estimation of 26 constituents present either as impurities in titanium or as alloying elements. The appearance of a mere collection of recipes is avoided however, by an introductory paragraph for each constituent which summarises the reactions involved.

In many cases, alternative methods of analysis are described, providing either a rapid routine technique or one of superior accuracy for reference purposes; in all cases the reproducibility attained is stated.

Brief instructions for identification of types of alloys by spectrographic or spot tests are included.

The vexed question of sampling, the prime difficulty of analysis of metals produced in sponge form, is extremely well covered, with the inclusion of useful details of machining speeds, tool rakes and unlikely but important points such as a warning regarding removal of protective paint from hacksaw blades. A point to question is the recommendation that an arc-melted evaluation button should be prepared for oxygen and hydrogen estimation. It seems unlikely that the hydrogen content of the button would be similar to that of the granules; if time permitted a more accurate figure would be obtained by examination of several larger portions for hydrogen alone by vacuum extraction.

Estimation of hydrogen and oxygen are adequately covered, although in the case of the vacuum fusion method it is disappointing to find that an extremely complex 'tree' has supplanted the original simple and inexpensive loading arm with which, by the use of a magnetic ram and a little dexterity, samples could be examined in any order.

Little fault can be found in the methods of analysis, which in many cases would also apply to zirconium and hafnium with little modification. It is surprising however to find that magnesium is quantitatively recovered by precipitation of the hydroxide in quantities as small as 0.2 mg at the 0.05 pct. Mg level; also the use of toluene 3:4 dithiol for estimation of tungsten could well be replaced by the more stable diacetyl derivative.

Despite a few very minor flaws, the book is wholeheartedly recommended to all analysts whose duties bring them into contact with titanium or its alloys.

J. A. CALDWELL

Chemist's Bookshelf

ANALYSIS IN NUCLEAR FIELD

PROGRESS IN NUCLEAR ENERGY. Series IX ANALYTICAL CHEMISTRY, Vol.I. Edited by *M. Kelley*. Pergamon Press, London, 1959. Pp. 372. 105s.

This book forms the first volume devoted to analytical chemistry in the Pergamon series 'Progress in nuclear energy' which covers 12 titles in all. The present volume contains a number of the papers of analytical chemical interest which were presented at the Second International Conference on the Peaceful Uses of Atomic Energy at Geneva in 1958. Twenty-six papers are reprinted in this present volume. These are divided into five distinct sections—reactor applications, activation analysis, spectographic techniques, industrial applications, and finally, health physics.

It is difficult for a reviewer to select from a collection of papers by so many authoritative chemists a few for special mention; generally those chosen reflect the reviewer's personal interests and the present case is no exception. The seven papers on reactor applications deal mainly with the analytical chemistry of thorium, uranium, and plutonium. These provide a sound foundation of basic chemical information which can be applied to the special conditions of reactor research. Of considerable interest are the reviews by Banks on the analytical chemistry of thorium, and by Steele and Taverner on the determination of uranium. The section on activation analysis contains four papers, one of which by Soviet authors deals with the use of radioactivation analysis for the determination of trace impurities in highly purified materials. The section on spectographic techniques contains seven papers, and deals with the determination of uranium, the i.r. spectrometry of heavy water and mixtures of this with water. One paper describes the X-ray spectrometric analysis of reactor fuel components. The remaining two sections (industrial applications and health physics) containing six and three papers respectively deal with subjects such as remote control analysis, analytical services in industrial atomic energy, and the determination of Sr^{89} and Sr^{90} in urine and sea water. Two of the twenty-six papers are published in French.

The present volume reflects considerably the truly international nature of these conferences on atomic energy. The Big Four are well represented and contributions from Poland, Sweden, South Africa, West Germany, Japan, Canada, Netherlands, Belgium and Hungary complete the forum.

It is interesting for the non-specialist to read these papers. He can learn how established procedures have been developed for the solution of problems so particular to the various atomic energy projects. Whether this justifies the price of 5 guineas is another matter,

Undoubtedly these papers, which have been selected from the conference programme on the basis of their particular relevance to nuclear energy, will be of considerable value to the analytical chemists working in this field.

WILLIAM I. STEPHEN

Practical Approach to Scale-up

SCALE-UP IN PRACTICE. Edited by *R. Fleming*. Reinhold, New York, 1958. Pp. iv+134, 36s.

This book is a collection of papers and edited discussion from an 'Experience in industry' symposium jointly sponsored by the American Institute of Chemical Engineers and the University of Pennsylvania, under the title of 'Scale-up in Practice.' This symposium was held in April 1958 and is the seventh in the series of these symposia to be published in this form. A number of the earlier members of the series have already been reviewed in CHEMICAL AGE in a somewhat critical manner and it is pleasing, therefore, on this occasion to be able to report favourably on the present volume.

The book begins with a paper on the use of pilot plants in scale-up, by H. J. Ogorzaly, which gives a clear analysis of the nature and function of pilot plant work. This is followed by what is possibly the best paper in the book, scale-up theory and its limitations, by A. B. Metzner and R. L. Pigford. There is a particularly useful discussion on reactor scale-up which manages to treat this difficult subject in an easily understandable manner without the use of the pages of mathematical manipulations so beloved by European writers on this topic. It is extraordinary, however, to find no mention either here or elsewhere in the book of the excellent text on scale-up by Johnstone and Thring.

The use of analogue computors for scale-up is dealt with by C. W. Worley in a practical and helpful manner, although the subject is so large and complex that it inevitably suffers from the necessary compression into a short article. A measure of the interest in this field is the fact that the discussion on this paper is almost twice as long as, and incidentally of a rather higher standard than, the discussion on any other paper. Pitfalls in scale-up, the next paper by F. W. Kopf, is something of an anticlimax, coming into the category of stories of people's mistakes.

The book concludes with three papers on the economics and organisation of scale-up, all of which give an excellent summary of the costing and economics of new processes with a strong practical emphasis. In general this is an excellent little book and one to be recommended particularly to final year students or young practising chemical engineers.

D.C.F.

Works Design for Chemical Engineers

CHEMICAL ENGINEERING PRACTICE, Vol. 11, Works Design, Etc. By *H. W. Cremer* and *S. E. Watkins*. Butterworths, London, 1960. Pp. 390, 95s.

The latest volume of this series is published out of order after Vol. 6. This in no way detracts from its value since the material covered could easily have been made the basis of Vol. 1.

There are nine chapters in all, which logically divide themselves into two main sections, namely all that is involved in the building and planning of a works right up to the installation stage, and secondly factors which must be considered in the running of a large works.

Each section has been written by an expert in his own field. Starting with the preparation of preliminary reports, involving all aspects of choice of site and site survey, the text then deals with aspects of civil engineering including buildings and foundations. This is followed by a useful section on contracts and contract documents, while the fourth chapter deals with construction planning and plant installation.

In the second half of the book, the major part is devoted to works organisation. This portion of the book deals thoroughly with all aspects of modern industrial administration and management. The remaining three sections deal with the Factory Acts and other legislation, the Alkali Act, and patents.

This latest volume is an exceedingly useful contribution to the series. It is easy to read, well written and is supported by large numbers of references. It will find use among scientists, engineers and administration at all levels, and in a large variety of industries.

E. J. CHARLES

Making Best Use of Chemical Literature

A SHORT GUIDE TO CHEMICAL LITERATURE. By *A. Malcolm Dyson*. 2nd Ed. Longmans, Green and Co., London. 1959. Pp. 157. 15s.

For those who wish to make the best possible use of the chemical literature Dr. Dyson's new edition fulfils its purpose. Not only must a chemist know his sources of information and methods of carrying out research, he must be able to train others.

In effect this work is an annotated bibliography of the essential dictionaries, encyclopaedias, journals, texts and reference works now available. The scope and value of these is defined. Examples of likely problems in literature surveying are included. A table of the most important journals with their volume numbers for each year of publication is useful, and also the list of obsolete journals with their abbreviations.

This book will be welcomed by chemical libraries and university teachers, and for the university student should prove invaluable.

D.L.M.

PEOPLE in the news

● **Mr. Anthony Norman,** chairman of Electronic Instruments Ltd., Richmond, has just returned from a month's tour of Canada and the U.S. where he made co-operative research arrangements with the Wilton Roy Co., Philadelphia. E.I.L. have always advocated research on new techniques, says Mr. Norman, and not in competition with other companies. Research activities of the two companies will be pooled so that both will get the benefit of each other's ideas.

● **Mr. L. G. J. Engle,** manager of the Southern Sales Region of Shell Chemical Co. Ltd., has retired. He joined the Shell Group in 1922 and was engaged on the marketing and marine side of the company's business before transferring to the chemical side in 1947. Before being appointed regional manager in 1955, he was in charge of detergent sales in Southern England. **Mr. M. B. Creed,** who is appointed regional manager as his successor, joined the Shell Group in

M. B. Creed

1938 and, after war service, returned to Shell Petroleum Company. He transferred to the chemical side of the Group's activities in 1948. In 1954 he was appointed chemical sales manager in the London area. Following expansion of the company's business, he became the regional sales manager for solvents and resins, a post he has held since 1957.

● Officers of the Pharmaceutical Society for the coming year are: President, **Mr. Thomas Reid,** "June Meadow," Haslemere; vice-president, **Mr. H. S. Grainger,** chief pharmacist, Westminster Hospital; and treasurer, **Mr. W. Spencer Howells,** "Springfield," Spring Gardens, Whitland, Carmarthenshire.

● **Mr. Norman C. Fraser, M.A., M.I.Chem.E.,** deputy chairman of W. J. Fraser and Co. Ltd., was elected chairman of the British Chemical Plant Manufacturers' Association at the recent annual meeting. He is the third member of his family to hold this office; his father, the late L. M. G. Fraser, was chairman for 1922-24, and his brother, Mr. Keith Fraser, for 1944-46. Other officers are: vice-chairmen, **P. D. Doulton** (director, Matthew Hall and Co. Ltd.), **Dr. R. Lessing, C.B.E.** (managing director, Hydronyl Syndicate Ltd.), and **R. W. Rutherford** (director, Power-Gas Corporation Ltd.); hon. treasurer, **H. W. Fender** (managing director, Prodorite Ltd.). A ballot to fill council vacancies resulted in the election of: **J. Bishop** (managing director, Nordac); **H. E. Cooper** (joint managing director, G. A. Harvey and Co.); **G. V. C. Davies** (director, Humphreys and Glasgow); **R. H. Dodd** (managing director, Chemical Construction); **Dr. J. B. Gardner** (research and development director, British Oxygen Engineering); **I. M. O. Hutchison** (joint managing director, Henry Balfour and Co.); **B. H. Turpin** (managing director, Q.V.F.).

● **Dr. H. Hollings, O.B.E., D.Sc.,** who as stated in 'People in the News,' 28 May, has been elected chairman of Nordac Ltd., Uxbridge, Middlesex, is also a director of British Carbo Norit Union Ltd., and of United Analysts Ltd. Until 1952 he was controller of research to the North Thames Gas Board, afterwards being retained as a consultant by Woodall-Duckham Construction Co. Ltd., and by Whessoe Ltd. Dr. Hollings

Dr. H. Hollings

maintains his interest in gas research and represents Leeds University on the Gas Council's joint research committee.

● **Mr. Henry Pfeffer** has joined the board of United Indigo and Chemical Co. Ltd.

● **Sir Graham Hayman,** chairman of the Distillers Company Ltd., has relinquished the chairmanship of B.T.R. Industries Ltd., but retains his seat on the board. **Sir Walter Worboys,** who retired from the I.C.I. main board last year, has been elected chairman of B.T.R. Industries.

● Presentation of awards took place during the recent annual dinner of the Society of Dyers and Colourists, as follows: Hon. member: past president **Clifford Paine, B.Sc.,** who was presented with the Society's illuminated address, of honorary membership, "in high appreciation of his devoted service to the Society." The Perkin Medal: past president **Cecil John Turrell Cronshaw, D.Sc.,** "as a leader under whose enthusiastic guidance the phthalocyanine pigments and derived textile dyes were first made available and their basic constitution established," and **John Thompson Marsh, M.Sc.,** "for outstanding contributions to the practice and the literature of textile chemistry. The Society's Gold Medal: **Heinrich Ris Dr. Phil,** vice-president of the International Federation of Associations of Textile Chemists and Colourists: "for distinguished contributions made over many years to international relations amongst dyers and colourists." **Ian Durham Rattee, B.Sc.,** and **William Elliot Stephen (Hons.) Ph.D.,** "for the invention and development of the first practical system of colouring cellulosic fibres with reactive dyes."

● **Mr. N. G. Bassett Smith,** general manager of Dunlop's recently renamed Chemical Products Division (see CHEMICAL AGE, 4 June, p. 925) has left for a month's tour of prominent American

N. G. Bassett Smith

chemical plants. He is accompanied by **Mr. T. Thomas,** the division's technical manager. Mr. Bassett Smith, who is at present chairman of the British Rubber and Resin Adhesive Manufacturers' Association, first joined Dunlop in 1927. After service in the second world war he returned as sales manager of Dunlop Special Products and became manager of the Compositions Division (now renamed the Chemical Products Division) when it was formed. He was appointed general manager in 1957.

● **Mr. F. R. Soer, A.R.I.C.,** formerly with the U.K. Atomic Energy Authority, Springfields, has been appointed assistant general manager of Universal-Matthey Products Ltd.

● **Dr. J. R. Majer, M.Sc., Ph.D.(Lond.),** has been appointed a lecturer in the Department of Chemistry, Birmingham University.

● **Mr. P. J. Gay,** president of the Oil and Colour Chemists' Association and technical director of Hangers Paints Associated Companies Ltd., accompanied by Mrs. Gray, will be leaving London Airport on 10 June for their visit to the second Australian technical convention. On his way to Australia, Mr. Gay will call at Karachi, where he will meet members of the association resident in west Pakistan and discuss the possibility of organising activities there. At Sydney he will meet members of the New South Wales Section before

People in the News

(*Continued from page 961*)

travelling to the Mayer Chalet, Warburton, near Melbourne, for the technical convention (16-19 June), which is being organised by the Victorian section. At the convention, Mr. Gay will preside at the inaugural meeting of the O.C.C.A. Federal Committee of Australia. He will also attend a meeting of the South Australian Section, and on leaving Australia the president and Mrs. Gay will meet members in Auckland and Wellington. On the homeward journey, Mr. Gay will meet the president of the Federation of Societies for Paint Technology, Mr. R. C. Adams, and will discuss with him and other Federation officers the findings of the association's Light Fastness Committee, to obtain their reactions.

● **Dr. E. S. Hedges,** director of the International Tin Research Council, left London recently on an extended tour of the Continent for a number of conferences devoted to organotin compounds. After visiting the Council's offices in Dusseldorf he will go on to Bonn, Frankfurt and Marienberg before visiting Basel in Switzerland and Vaduz (Liechtenstein). He will also make calls in Vienna and Milan.

● **Mr. G. H. Doust** has been appointed general manager of Plessey International Ltd. Before joining the company in November 1958 as deputy to the general manager, he was with the Plessey Chemical and Metallurgical Division at Towcester, Northants, where he controlled the commercial and sales department. Mr. Doust was for some time field sales manager of the Metal Finishing Division of the Pyrene Co. Ltd.

● **Mrs. M. M. Hardy, M.A.,** tutor in chemistry, has been elected to an official fellowship of Somerville College, Oxford, from 1 October.

● **Mr. M. E. Klee,** president of the Intercontinental Chemical Corporation, New York, a subsidiary of Farbwerke Hoechst AG, Frankfurt-on-Main, has been elected president of the German-American Chamber of Commerce.

● Executive committee of the Industrial Pest Control Association for 1960-61 is: **D. Boocock** (Standardised Disinfectants Co.), **Dr. F. P. Coyne** (I.C.I.), **S. R. Gauntlett** (Disinfestation), **D. M. Simpson** (Cooper McDougall and Robertson) and **H. D. H. Womack** (Shell Chemical). As stated last week, **Mr. D. J. S. Hartt** (May and Baker) is president.

● **General Sir Geoffrey Bourne, K.C.B., K.B.E.,** has been appointed director general to succeed **Air Commodore W. Helmore, C.B.E.,** who recently retired after 14 years as director-general of the Aluminium Development Association.

● **Professor M. Stacey, F.R.S.,** Mason Professor of Chemistry, Birmingham University, has been appointed deputy Dean of the Science Faculty for the period 18 July 1960 to 16 July 1961.

N.C.B.'s By-product Output in 1959

IN 1959 National Coal Board coking plants produced 6,249,000 tons of coke and breeze; 367,000 tons of crude tar; 26 million gall. of crude benzole; 65,000 tons of sulphate of ammonia; 15,000 tons of other ammonia products, and 55,000 million cu. ft. of gas. The Phurnacite plant produced 645,000 tons of 'Phurnacite' and 27,000 tons of crude tar. At secondary by-product plants, 233,000 tons of crude tar and other material were distilled and 31 million gall. of crude benzole and other material were rectified. Several coking plants were closed to restrict coke production and others were operated at a reduced level.

Much of the effort of the N.C.B. Coal Research Establishment has been devoted to finding new processes for making high quality smokeless fuels from low cost non-coking coals. Two processes have reached the stage of pilot scale development, and the board has set up a new Process Development Department to ensure that sufficient effort is concentrated on bringing these and other promising new processes for coal utilisation as quickly as possible into commercial production.

The contract for installing a Ruhrgas slagging gasifier at Manvers Main coking plant was approved before the end of the year and work will begin in 1960. It will use low grade coal to make producer gas for under-firing coke ovens. During the year the Board co-operated with the West Midlands Gas Board in a study of coal supplies for the Lurgi gasification plant to be constructed at Coleshill; the plant is expected to use 420,000 tons a year of non-coking coal from West Midlands collieries.

Recorders for Chromatographs and Spectrophotometers

Initial orders for over 250 Electronik strip chart recorders by Honeywell Controls Ltd. have been placed by W. G. Pye Ltd. and Unicam Instrument Co. Ltd., for use in new analytical equipment.

These instruments, of the self-balancing potentiometer type, are to be embodied as standard in newly developed Pye Argon chromatographs and Unicam flame spectrophotometers. Some of the recorders give multi-records and embody a four-speed gear box. The new analytical equipment will be used in gas chromatography, research and routine analytical chemistry, industrial process instrumentation and similar applications.

Scientific Instruments Leave for Moscow Exhibition

Four of the five trailers that are carrying more than 650 instruments worth £250,000 are seen here being loaded on the 'Bardic Ferry' at Tilbury for shipment to Rotterdam en route for Moscow

MORE than 650 scientific instruments, worth £250,000, left Tilbury Docks on 30 May in the m.v. *Bardic Ferry* for the first ever exhibition to be held in Moscow from 18 to 29 June by the Scientific Instrument Manufacturers' Association. The instruments are being carried in five trailers, which on arrival at Rotterdam will be forwarded to Antwerp to make the remainder of the 1,652 miles journey to Moscow.

Forty firms will take part in the exhibition, which is to be opened on 18 June at Moscow Polytechnic by Sir Patrick Reilly, the British Ambassador.

The transport services were organised by Continental Ferry Services Ltd., and Lep Transport are the exhibition contractors and forwarding agents.

Bradford By-products Sales Increase

LAST year the sale of grease and by-products by the Bradford Sewage Committee was higher with an income nearly 30% up on the previous year, according to the annual report of Mr. W. H. Hiller, engineer and manager. The total from sales of grease and specialised products last year was £163,280 (£127,923), with sales of fertiliser yielding £22,000, an increase of £7,530. The total income earned by the department since sales began early in the century now amounts to £6,186,280.

The year's substantial increase was largely due to higher orders for grease in this country and abroad. The sale of specialised products, particularly fatty acids and sheep marking fluids, also showed an improvement. Demand for powdered organic fertiliser was so heavy that in part of the year there was difficulty in meeting orders.

Market Reports

Overseas Inquiry Still at Good Level

LONDON Demand for industrial chemicals during the past week has been reasonably good for the period, and contract delivery specifications have covered good quantities. The volume of overseas inquiry for chemicals and allied materials continues to be maintained at a high level.

There has been little of fresh importance to report on the market for agricultural chemicals, and most of the coal tar products continue in steady request.

MANCHESTER Activity on the Manchester market for general chemicals has been affected by holiday conditions. Deliveries to the textile and allied mills and to other industrial outlets have been reduced and fresh business has also been on a smaller scale. However, an early return to normal market conditions is anticipated. In the meantime, quotations generally show little change.

SCOTLAND The past week has shown a good level of activity in most sections of industry. Demands have in no way been limited and both those against current and contract requirements have featured well.

The position in regard to agricultural chemicals is unchanged with a good volume of business transacted in immediate requirements with demands for weedkillers in particular still very active.

Prices have mostly remained at a steady level although there has been a reduction made in some solvents. The overseas market is still showing considerable interest.

Commercial News

Baird and Tatlock

Derbyshire Stone Ltd., a public company closely connected with the chemical industry, have acquired the ordinary shares in Baird and Tatlock (London) Ltd., and thus automatically control the subsidiaries, Hopkin and Williams Ltd. and W. B. Nicholson (Scientific Instruments) Ltd. Mr. H. Fletcher, J.P., Mr. J. W. Hobday and Mr. G. Henderson have been appointed directors of the three companies. Mr. J. E. C. Bailey, C.B.E., continues as chairman and managing director of the B.T.L. group.

The group will continue to trade as before, backed with the experience and finance of Derbyshire Stone. Expansion of the individual group companies is already being planned and will, it is stated, ensure an increasing flow of new instruments and chemicals for laboratories and industry.

The B.T.L. Research and Development Division has been doubled in size in view of rising demand for Analmatic equipment and for new and redesigned standard laboratory instruments and apparatus. Two main sections of the division have been formed: research and development (Analmatic instruments) and research and development (general instruments). The division will continue to operate under the direction of Sir Bernard Keen, F.R.S.

A. Boake Roberts

Group profit of A. Boake Roberts and Co. (Holdings) Ltd., now controlled by Albright and Wilson, for the year to 27 March was up 185% at £237,364 (£83,434). Minority interests totalled £9,621 (£6,560). Dividends paid during the year totalled 17%, including interim of 7½% paid before the 1-for-3 scrip issue (total of 15%).

Greeff-Chemicals

Turnover and trading results of Greeff-Chemicals (Holdings) Ltd. were at record levels in 1959, said Mr. S. Bayliss Smith, chairman. Turnover to date in 1960 has continued to rise and figures available are "very satisfactory." For results see 'Commercial News,' 14 May, p. 814.

Merck and Co.

Increasing competition in the chemical and pharmaceutical sphere led to a fall in profit for the Merck and Co. producing concern of Rahway, New Jersey, in the first quarter of this year. Although sales rose from $55.8 million to $56 million over the quarter, net profit fell from $7.9 million, or $0.73 per share, to $7.4 million, or $0.69 per share.

Rumianca

The Italian chemical concern Rumianca (Società per l'Industria Chimica e Mineraria), of Turin, announces for the financial year 1959 a decreased net profit of L590 million (L999 million) after depreciation of L750 million (same). The company is to pay 10% (same) on its L10,000 million worth of shares. The drop in profit was due to the price decrease for synthetic fertilisers in Italy. Among new projects are a plant in Pavia to produce sulphur carbamate, to start up at the end of this year, a plant now under construction for the production of some 2,000 tonnes of oxalic acid; plants for the production of 1,000 to 2,000 tonnes annually of monochloracetate acid and for other chlorine chemicals; and extra plant to expand the company's DDT production to 12 tonnes/year.

NEW COMPANIES

DISTRIBUTORS (WEST MIDLANDS) LTD. Cap. £100. To manufacture and deal in solvents, cleaning powders and materials, soap and washing materials, oils, greases, perfumes, oleaginous and saponaceous substances, etc. Directors: H. S. Boards and E. H. Boards, both of 157 Chase Road, Burntwood, Nr. Lichfield.

EAST LANCASHIRE SOAP COMPANY LTD. Cap. £100. To acquire the trade name of 'Dr. Lovelaces Family Soap' and the goodwill, formulae and connection of the business formerly carried on by the East Lancashire Soap Co. Ltd., at Clayton le Moors, etc. Directors: J. T. Terleslei, 1 Wood Road, Sale, Ches., and A. Russell, 29 Delamere Avenue, Salford, 6, both directors of David Thom and Co. Ltd. Secretary: A. Russell. Solicitors: F. Edwin Monks and Co., Manchester. Reg. office: Indigo Street, Manchester, 6.

W. E. TETLEY LTD. Cap. £7,500. To acquire certain assets of the business now carried on at Birkenshaw, near Bradford, as W. E. Tetley and to manufacture and deal in chemicals, gases, drugs, medicines, etc. Directors: E. F. Tetley, 604 Bradford Road, Birkenshaw, near Bradford. Mrs. L. Tetley, F. Tetley. Sec.: G. Brown. Reg. office: Parkinsons Chambers, 49 Hustlergate, Bradford.

UNIT DYES CO. LTD. Cap. £1,000. To manufacture and deal in dyes, dry colours, plastic colourants, chemicals, etc. Brian E. Richardson is the first director. Secretary: W. S. F. Stagg. Reg. Office: 147 Becontree Avenue, Dagenham, Essex.

WOOLITE LTD. Cap. £10,000. To acquire from Charles J. M. van Bergen, of Melbourne House, Aldwych, London W.C, the whole of the right, title and interest granted to him by Harvey S. Hewitt under agreement dated 4 March 1960. To manufacture and deal in soaps, detergents and other preparations, and in particular to manufacture, market and sell the product Woolite, etc. Reg. office: 12 Whitehall, London S.W.1.

LONDON GAZETTE

Partnership Dissolved

H. E. AND W. R. HONEY (Henry Edwin, Ellis Honey and Walter Reginald Honey), chemical manufacturers, 16 Station Road, London N.W.10. Dissolved as from 26 March, following death of H. E. E. Honey. All debts due and owing by the firm should be received and paid by W. R. Honey, who will continue the business under the same style.

Fall in Chemical Wholesale Price Index

WHOLESALE price index of the Board of Trade showed a slight fall in April so far as the chemical and allied industries are concerned. Based on a 1954 average of 100, the index shows a provisional figure of 105.3 for April (provisional figure of 105.5 in March and 105.9 in April last year. The index for home market sales stood at a provisional 106.5 in March (106.8 in March and 107.0 in April 1959). The following is an extract from the index:

	April 1959	March 1960	April 1960
General chemicals ...	106.8	105.2	105.0*
Pharmaceutical chemicals	82.2	81.6	81.4*
Pharmaceutical preparations	101.8	103.1	101.1
Soap	127.2	128.8	128.8
Soapless detergents ...	104.4	103.6	103.6
Synthetic resins & plastics materials ...	90.2	89.5	89.5*
Commodities Wholly or Partly imported			
Pyrites, c.i.f. U.K. ports	64.5	65.9	64.2
Sulphur, crude (for acid making), c.i.f....	78.3	75.6	75.6

Work Started on Newton Chambers Redevelopment

The £300,000 chemical works redevelopment of Newton Chambers and Co. Ltd., at Thorncliffe, Sheffield, is making good progress, and the area for the first phase of construction, the sites for the main production section of the building and the raw material tank farm, have been cleared.

General contract for the redevelopment was awarded to Charles R. Price of Barnsley Road, Doncaster, who began the work early in May. The foundation and structural work is being carried out under the direction of Mr. J. C. Bianco, consulting engineer, of 239 Shaftesbury Avenue, London, while the sub-contract for supply, fabrication and erection of the structural steelwork has been awarded to Dorman Long (Bridge and Engineering) Ltd., Middlesbrough, who are scheduled to begin the erection of the first sections of the structural steelwork in July. The redevelopment as a whole is being undertaken in two phases because it is essential to replace the old Norfolk works and chemicals factory without interruption of production.

B.N.S. Hold First Nylon Convention

THE first industrial convention to be held by British Nylon Spinners Ltd. took place at Park Lane House, London, recently. The convention took the form of a comprehensive exhibition of the industrial uses of nylon and the presentation of a number of papers on technical and commercial subjects.

Some of the more spectacular features of the exhibition were the large inflatable buildings and nylon tanks for the transportation of liquids in bulk. A large amount of the development work in the nylon industry has been devoted to producing suitable nylon base fabrics and proofing compounds. The latter at the moment consist of p.v.c., neoprene or polyurethane.

TRADE NOTES

Agents for ANIC Rubber

Hect, Heyworth and Alcan, 3 Mincing Lane, London E.C.3, have been appointed agents for ANIC synthetic rubbers for the U.K. and Eire. From 1 June they will be able to supply ANIC SBR, imported from Ravenna.

Carbon Black Price Cut

From 1 June the following prices for Ukarb 327 carbon black will apply, state Wilfred Smith Ltd., in association with Hubron Rubber Chemicals Ltd., Ukarb distributors: minimum 3 ton lots, 6¼d./lb. ex works; 1 ton lots, 7¼d./lb. ex works; smaller quantities 7¾d./lb. ex store.

Polyethylene Glycols

A new 40-page booklet describing Carbowax polyethylene glycols for use in pharmaceuticals and cosmetics has been issued by the Chemicals Department, Union Carbide International Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y., U.S.A. Applications for nine grades of Carbowax polyethylene glycols, ranging in molecular weights from 200 to 6,000, are discussed. Data on physical and physiological properties; solubilities; aqueous solution viscosities, surface tensions, and phase diagrams; hygroscopicity; and viscosities of polyethylene glycol blends are included.

Price Increases

Increased prices for water stills and punches, from 1 July, are announced by Manesty Machines Ltd., 6 Evans Road, Speke, Liverpool 24. Prices of water stills and spares will be advanced by about 5%; for punches and dies, the basic prices of plain round tooling will be advanced by about 10%, but extra charges for embossing, etc., will be unchanged.

Engineering Agents

A new company, K. A. Ballard Ltd., has been formed by Mr. K. A. Ballard to act as engineering agents and consultants, with emphasis on the petroleum, petrochemical and chemical industries. The field of activity will embrace general fabrication for the movement and storage of fluids in these industries, including pipes, pipelines, fittings, valves, pumps and road tankers. The company is operating from Woodthorpe, Church Road, Worcester Park, Surrey (Derwent 4112).

Modifying Plasticisers

Two plasticisers, Reomol MN and Reomol MI, intended mainly as modifiers for use with phosphate and phthalate type p.v.c. plasticisers, are described in Technical Data Sheet No. 17 issued by the Geigy Co. Ltd., Rhodes, Middleton, Manchester.

Ceramic Labelled Bottles

Bottles listed under B15/022, B15/023 and B15/031 in sizes 175, 250, 350 and 500 ml. are now being supplied with ceramic labels by Baird and Tatlock (London) Ltd., Freshwater Road, Chadwell Heath, Essex, who have developed a new technique for applying the labels. These are fired into the glass, giving a permanent label that resists chemical and mechanical attack. The new method has led to considerable reductions in the prices of the bottles. In addition to the chemical names listed under B15/031, more than 350 other names are available ranging from dilute acetic acid to granulated zinc.

High-purity Sublimed Magnesium

Highly pure sublimed thermic magnesium, produced by Soc. Generale de Magnesium, Paris, is now available from Upsil Ltd., a Péchiney-Uclaf company, at Marshgate Lane, London E.15. Price per 1 kg. is N.Fr.7.80 ex works (Beaudean, Hautes-Pyrénées), in airtight packaging. It is stated that a considerable reduction is available for orders exceeding 100 tons a year.

New Coal Tar/Epoxy Coating

A new protective coating Tretol coal tar/epoxy 177 has recently been developed by Tretol Ltd., The Hyde, London N.W.9, which in two coats are said to attain a film thickness of 20/1000 in. equivalent to some 15-20 coats of normal paint, at a fraction of the cost. Outstanding resistance is claimed to all forms of attack by acids, alkalis, oil, sewage and brine; excellent adhesion is obtained without priming on metals and concrete.

Epoxide Resins for Cable Jointing

A series of epoxide and polyester systems for cable jointing are being marketed by Bakelite Ltd., 12-18 Grosvenor Gardens, London S.W.1. General particulars of relevant epoxide materials, including suggested formulations, are given in advance information sheet E.40.

Minerals and Chemicals

Jenolite Ltd., 13-17 Rathbone Street, London W.1, have been appointed sole importers and distributors of the range of products of Minerals and Chemicals Corporation of America, Menlo Park, New Jersey, U.S. The products cover three main groups: aluminium silicate pigments; Attapulgus clay products used widely in the petroleum refining and processing, chemical conditioning, plastics, fertiliser industries, etc.; and activated bauxite products for the oil refining, chemical, agricultural, gas and other industries. Literature and samples are available. Bulk stocks will be held in London and Liverpool.

Firth Cleveland Pumps

New leaflets available from Firth Cleveland Pumps Ltd., Earl Shilton, Leics., a member of the Firth Cleveland Group, disclose a number of alterations in the company's range of self-priming centrifugal pumps. The displacement pump is available in two marks, each of which may be powered by petrol or electric motors. Design features include automatic control float switches and mechanical or mercury break as required.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 6 July

Purification of polyolefins. Hercules Powder Co. **840 233**

Manufacture of quinolizine derivatives. Roche Products Ltd. **840 267**

Catalytic reforming. British Petroleum Co. Ltd., White, P. T., and Ward, D. S. **840 269**

Analgesic, 2-hydroxymethyl-6-phenyl-3-pyridazone. Lepetit SpA. **840 552**

Methods of recovering aldehydes and alcohols. Union Carbide Corp. **840 272**

Esterification of pyridine carboxylic acids. Abbott Laboratories. **840 459**

Stabilised hydrocarbon polymeric materials. Western Electric Co. Inc. **840 460**

Guanidine nitrate recovery. American Cyanamid Co. **840 198**

Production of organic silicon compounds. Monsanto Chemical Co. **840 278**

Process for the continuous production of hexamethylene diamine from adipic acid dinitrile. Vereinigte Glanzstoff-Fabriken AG. **840 468**

6-methyl steroid compounds and the preparation thereof. British Drug Houses Ltd. **840 477**

Nitrogen derivatives of phenylalkanols and process for the preparation thereof. Morren, H. **840 096**

Preparation of polymeric polyhydric alcohol esters. Schenectady Varnish Co. Inc. **840 401**

Cyclic organo-silicon compounds. Midland Silicones Ltd. **840 402**

Method of preparing preliminary metal or steel from pig iron containing phosphorus. Klöckner-Werke AG. [Addition to 823 996.] **840 242**

Monoazo dyestuffs containing aminosulphonylamino groups and their metal complex compounds. Sandoz Ltd. **840 178**

Preparation of 6-methyl steroid compounds. British Drug Houses Ltd. **840 246**

Preparation of phenyl halomethyl thioethers. Stauffer Chemical Co. **840 405**

Process for the production of readily soluble mixtures of alkali metal alkyl benzene sulphonates. Bataafsche Petroleum Maatschappij N.V., De. **840 406**

Reaction products of triglycidyl cyanurate with dihydric phenols. Devoe & Raynolds Co. Inc. **840 181**

Monoazo dyestuffs containing disulphimide groups and their use. Geigy AG., J. R. **840 182**

Irradiated polyethylene. Esso Research & Engineering Co. **840 070**

Production of high molecular weight polyurethane plastics. Farbenfabriken Bayer AG. **840 097**

Dyestuffs for the dyeing and printing of polymers or co-polymers of acrylonitrile or asdicyanethylene. Farbenfabriken Bayer AG. **840 282**

Open to public inspection 13 July

Manufacture of polymeric methacrylic acid products. Vinyl Products Ltd. **841 312**

Fibre- and film-forming polyanhydrides. Gevaert Photo-Producten N.V. **840 846**

Fibre- and film-forming polyanhydrides and their preparation. Gevaert Photo-Producten N.V. [Divided out of and addition to 840 846.] **840 847**

Anti-ozonant compositions for rubber and other unsaturated high polymers. Burke, O. W. **841 281**

Unsaturated carbamato ethers and thioethers, polymers thereof and methods of making them. Rohm & Haas Co. **840 891**

Azophenothiazine compounds and their preparation. Olin Mathieson Chemical Corporation. **840 892**

Process for producing water-insoluble azo-dyestuffs on animal fibres or mixtures thereof with other fibres. Farbwerke Hoechst Aktien-Gesellschaft Vorm. Meister, Lucius, & Brüning. **841 260**

Process and apparatus for recovering elementary sulphur from carbonization gases. Koppers GmbH., H. **841 483**

Theophylline derivatives. Ward Blenkinsop & Co. Ltd. **841 196**

Alkyl esters of C_{10} aliphatic dicarboxylic acids. National Distillers Products Corporation. **840 893**

Process for polymerizing lower olefines in a continuous manner. Farbwerke Hoechst Aktien-Gesellschaft Vorm. Meister, Lucius, & Brüning. **841 263**

Naphthyl esters of N-alkyl-substituted carbamic acids and insecticidal compositions containing same. Union Carbide Corporation, formerly Union Carbide & Carbon Corporation. **841 141**

Production of para-diisopropylbenzene. Mid-Century Corporation. **841 424**

Oxidation of organic compounds. Imperial Chemical Industries Ltd. **841 053**

Process and apparatus for the preparation of polyamides. Red-GmbH., and Cellulose, Polymeres & Derives Cepede S.A. **841 144**

Preparation of α-phenyl glutaric acid esters and of tetrahydro-oxo-naphthoic acid therefrom. Pfizer & Co. Inc., C. **841 145**

Tropane derivatives. Licencia Talalmanyokat Ertekesito Vallalat. **841 321**

Cyclopentanophenanthrene derivatives and process for the preparation thereof. Syntex S.A. **841 149**

Process for the stabilization of halogen-containing polymers. Farbwerke Hoechst Aktien-Gesellschaft Vorm. Meister, Lucius & Brüning. **841 151**

Preparation of 1-phenylcyclohexane-1-hydroperoxide. Montecatini Soc. Generale per L'Industria Mineraria E Chimica. **841 157**

Vulcanizable compositions. Burke, O. W. **841 159**

Manufacture of hydrogen peroxide. Laporte Chemicals Ltd. **841 022**

Steroids and the manufacture thereof. Upjohn Co. **841 241, 841 242 & 841,243**

Manufacture of a water-insoluble monoazo-dyestuff of the 2-(2¹:3¹-hydroxynaphthoyl-amino-naphthalene series. Farbwerke Hoechst Aktiengesellschaft Vorm Meister, Lucius, & Brüning. **840 804**

Polymerization of ethylene. Monsanto Chemical Co. **841 324**

Pentaerythritol diacetals. Celanese Corporation of America. **840 737**

Oxidation of organic compounds. Imperial Chemical Industries Ltd. **841 244 & 841 245**

Complex lead salts and a process for the production thereof. Hoesch, R., and Hoesch, O. **841 328**

Monoazo-pyrazolone-dyestuffs containing a cyanuric residue and process for their manufacture. Ciba Ltd. **840 742**

Reaction products and composition prepared therefrom. Rohm & Haas Co. **840 778**

Basically substituted butyric acid amides and process for their manufacture. Farbwerke Hoechst Aktiengesellschaft Vorm. Meister, Lucius, & Brüning. **841 330**

Cellulose propionate compositions. Celanese Corporation of America. **841 212**

Ester-exchange reactions. Celanese Corporation of America. **840 779**

Process for the manufacture of water-soluble aluminium salts. Farbenfabrik Wolfen Veb. **841 293**

Polymerization process and products thereof. Esso Research & Engineering Co. **841 295**

Recovery of unsaturated hydrocarbons. Lummus Co. **840 817**

Production of polyhydric alcohols. Inventa Aktiengesellschaft Für Forschung und Patentverwertung. **840 821**

Production of benzoic acid and substituted derivatives thereof. Imperial Chemical Industries Ltd. **840 822**

Method of making polymer latices. Esso Research & Engineering Co. **841 289**

Derivatives of piperidine carboxylic acids and process for preparing same. Lakeside Laboratories Inc. **840 824**

Process for the preparation of rubber-protein-aldehyde products. Nobel-Bozel, formerly Bozel-Maletra Soc. Industrielle de Produits Chimiques. **840 987**

Shaped parts made of high molecular weight thermoplastic polycarbonates and process for their manufacture. Farbenfabriken Bayer AG. **840 750**

Metallizable polyazo dyestuffs derived from 1-amino-8-naphthol-6-sulphonic acid, complex copper compounds thereof and their use. Geigy, AG, J. R. **840 898**

Production of polymers. Imperial Chemical Industries Ltd. **841 308**

Process for the oxidation of organic compounds to carboxylic acids and other products. Imperial Chemical Industries Ltd. **841 246**

Polybenzyl derivatives and a process for the production thereof. Deutsche Solvay-Werke G.m.b.H. **840 905**

Vinyl chloride interpolymers. Monsanto Chemical Co. **841 075**

Purification of saline water by crystallisation with a volatile refrigerant. Esso Research & Engineering Co. **841 374**

Quinolizine derivatives and process for the manufacture of same. Roche Products Ltd. **841 225**

Vulcanisation of synthetic rubbers. Imperial Chemical Industries Ltd. **841 079**

Thiazole-monoazo-benzene dyestuffs. Imperial Chemical Industries Ltd. **840 903**

Preparation of cleavage products from recinoleic acid and derivatives thereof. Soc. Des Produits Chimiques De Bezons. **840 906**

Dyestuff of the perylene tetracarboxylic acid series. Farbwerke Hoechst Aktiengesellschaft Vorm. Meister Lucius & Brüning. **840 760**

Polymerisation method and polymers produced thereby. Imperial Chemical Industries Ltd. **841 388**

Stabilised vinyl alkyl ether resins. Union Carbide Corporation. **841 088**

Manufacture of polymeric materials by Zeigler polymerisation processes. Petrochemicals Ltd. **840 861**

Polymerisation. Diamond Alkali Co. **841 172**

Isomerisation catalyst. Socony Mobil Oil Co. Inc. **841 174**

Purification of acrylonitrile. Distillers Co. Ltd. **840 831**

M, *M*¹-dioxydiphenols as coupling components in diazotype materials. General Aniline & Film Corporation. **840 945**

Organosiloxane co-polymers. Midland Silicones Ltd. **840 832**

Piperidine compounds. Macfarlan & Co. Ltd., J. F. **841 120**

Process and apparatus for the manufacture of thermoplastic fibres, particularly glass fibres. Manufactures des Glaces et Produits Chimiques de Saint Gobain, Chauny & Cirey S.A. Des. **840 862, 840 863**

3-hydroxy-3, 7, 11-trimethyl-4, 6, 10-dodecatrienoic acid and salts thereof. [Addition to 838 568.] Merck & Co. Inc. **841 122**

6-methyl steriod compounds. British Drug Houses Ltd. **841 003**

Sulpho esters of α-methylene carboxylic acids and polymers thereof. Dow Chemical Co. **840 908**

Inverse emulsion polymerisation of water-soluble monomers. Dow Chemical Co. **841 127**

Process for the manufacture of 4-sulphanilamido-2, 6-dimethoxy-pyrimidine. Hoffmann-La Roche & Co. A.G., F. **841 231**

Polymerisation of ethylenically unsaturated monomers. Du Pont De Nemours & Co., E. I. **841 129**

Polymerisation of mono-ethylenically unsaturated monomers. Du Pont De Nemours & Co., E. I. **840 910**

Azo dyestuffs of the naphthyl pyrazolones series and the copper complexes thereof. Farbenfabriken Bayer A.G. **841 413**

Process for the production of aryl- and substituted alkyl-thioethers. Farbenfabriken Bayer A.G. **840 911**

Metallised fluorocarbon resin. Montecatini Soc. General Per L'industria Mineraria e Chimica. **841 334**

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